Maths EUEE 2004 E.C

Grade 11

Unit One

1. If x<0, then the simplest form of f(x) = $\frac{x-|x|}{x}$ is equal to:

   A. 2x B. 2 C. -2 D. 0

2. If f(x) = $\frac{\sqrt{x+2}}{x+2}$ and g(x) = $\frac{1}{x}-2$, then f(g(x)) is equal to:

   A. $\sqrt{x}-2$ B. $\sqrt{x}+2$ C. $\sqrt{x}$ D. $\frac{\sqrt{x}}{x}$

3. If f(x) = ln $\left(\frac{x}{x-1}+2\right)$, for x>1, then which one of the following is the inverse off?

   A. G(x) = $\frac{e^x-2}{e^x-3}$ B. G(x) = $\frac{e^x-2}{e^x+1}$ C. G(x) = $\frac{e^x}{e^x+1}-2$ D. G(x) = $\frac{x}{e^{x-1}-2}$

Maths EUEE 2005 E.C

Grade 11

Unit One

1. What is the value of |x| + 2x if x<0?

   A. -3x B. 3x C. –x D. x

2. If f(x) = $\frac{1}{e^x+1}$, then which of the following is equal to $f^{-1}(x)$?

   A. $\ell n(1-x)-\ell n(x)$ B. $e^{-x}+1$ C. $\ell n\left(\frac{1}{x+1}\right)$ D. $\frac{1}{e^{-x}+1}$

3. Given f(x) = In(x-1) and g(x) = $\sqrt{1-2x}$, which one of the following is the domain of $f\ o\ g$?

   A. $\{x\in R: x>1\}$ B. $\{x\in R: x\le\frac{1}{2}\}$ C. $\{x\in R: x>0\}$ D. $\{x\in R: x>\frac{1}{2}\}$

Maths EUEE 2006 E.C

Grade 11

Unit One

1. *If* $f(x)=\sqrt[3]{1+e^{-x}}$ *, which of the following is equal to* $f^{-1}(x)$ *?*

   A. $\ell n\left(\frac{1}{x^3-1}\right)$ *B.* $\frac{1}{\ell n(x^3-1)}$ *C.* $\ell n(1-x^3)$ *D.* $(1+e^{-x})^3$

Maths EUEE 2007 E.C

Grade 11

Unit One

1. Which of the following functions is a one-to-one correspondence?

   A. F: $\Re\to\Re$,f(x)=tan x, where R' is the domain of f

   B. t: $\Re\to\Re$, g(x) = 2^x

   C. h:$[0,\infty)\to[0,\infty)$, $h(x)=x^2$

   D. r:$[0,\infty)\to[0,\infty)$, r(x)=x+5

2. The inverse of the function defined by g(x)= $\frac{2x}{x+3}$ is equal to:

A. $g^{-1}(x) = -\frac{2x}{x-3}$ C. $g^{-1}(x) = -\frac{x+3}{2x}$

B. $g^{-1}(x) = -\frac{3x}{x-2}$ D. $g^{-1}(x) = -\frac{x+2}{3x}$

Maths EUEE 2008 E.C

Grade 11

Unit One

1. Which one of the following is a one-to one correspondence function from A = $[0,1]$ to B= $[1,2]$?

A. $f(x) = x$ C. $f(x) = 2x+1$

B. $f(x) = \frac{1}{3}x^3 + 1$ D. $f(x) = x^2 + 1$

2. If the point (3, -2) is on the graph of y= f(x), which point is on the graph of y = $f^{-1}(x)$?

A. $\left(\frac{1}{3}, -2\right)$ B. (3, -1) C. (-2,3) D. $\left(3, -\frac{1}{2}\right)$

Maths EUEE 2004 E.C

Grade 11

Unit Two

1. Which of the following is a simplified form of $\frac{4-(c-2)^2}{a^2+2a^2+1} \div \frac{1-\frac{1}{a^2+1}}{a}$?

A. $\frac{4-a}{a}$ B. $-\frac{1}{a^2(a^2+1)}$ C. $\frac{a}{a^2+1}$ D. $\frac{4-a}{a^2+1}$

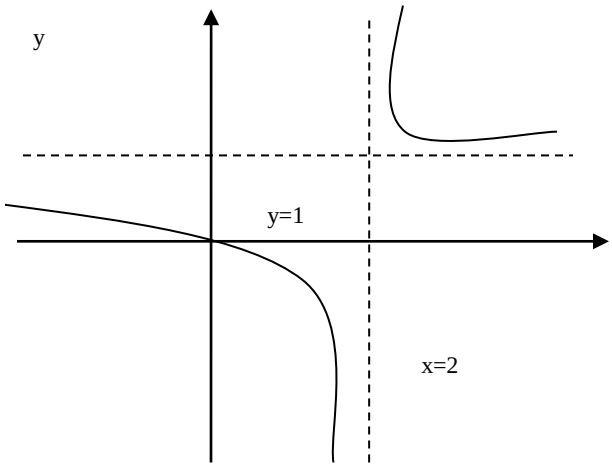
2. Which of the following functions could most likely be drawn as in the figure below?

A. f(x)= $\frac{x}{x-2}$

B. f(x) = $\frac{x^2+2x}{x^2-4}$

C. f(x) = $\frac{x+1}{x-2}$

D. f(x) = $\frac{x^3+2x}{x^2-4}$



Maths EUEE 2005 E.C

Grade 11

Unit Two

1. Which one of the following functions has NO vertical asymptote?

A. $f(x) = \ell n(x+1)$ C. $f(x) = \frac{x^2-9}{x-3}$

B. $f(x) = \frac{x^2+1}{x^3+8}$ D. $f(x) = \frac{x-1}{x^2-x}$

2. What is the solution set of $\frac{2}{x}-\frac{x-2}{x^2-2x}=1-\frac{2x-2}{3x-2}$?

A. {1,-2} B. {1,2} C. {-1} D. {1}

Maths EUEE 2006 E.C

Grade 11

Unit Two

1. *If* $f(x)=\frac{x+1}{x-1}$ *and f(a)=5 then f(2a) is equal to:*

A. 2 B. 4 C. 6 D. 8

2. *Which one of the following is true?*

A. A polynomial can have infinitely many vertical asymptotes.

B. The graph of a rational function can never cross its horizontal asymptote.

C. The graph of $f(x)\frac{3x-1}{x-1}$ *has no horizontal asymptote.*

D. The graph of $f(x)\frac{x^3-x}{x^2-x}$ *has not vertical asymptote.*

3. *Which one of the following is true about the graph of* $f(x)=\frac{x^2-1}{x-x^2}$ *?*

A. x = 0 and x = 1 are its vertical asymptotes.

B. Y = 1 is its horizontal asymptote.

C. Y = x – 1 is its oblique asymptote.

D. It is almost the same as the horizontal line y = -1 as $x\to\pm\infty$.

Maths EUEE 2007 E.C

Grade 11

Unit Two

1. Thevalue(x) of x where the graph of the function $y=\frac{x^2-1}{x^3}$ crosses its horizontal asymptote is (are):

A. x = -2 C. x = 0

B. x = -1 and x = 1 D. x = - $\sqrt{2}$ and x = 1 + $\sqrt{2}$

2. if p(x) = $3x^2$ and q(x) = x^2 + x, then what is the solution set of $\frac{p(x)}{3q(x)}-\frac{1}{x}=\frac{1}{q(x)}$?

A. {-1,2} B. {2} C. {-3,2} D. {-3}

3. Which of the following functions could most likely be drawn as in the Figure 1 below?

A. $\frac{x+3}{x+2}$

B. $\frac{x^2-2x}{x^2+4}$

C. $\frac{-x^2-x+6}{x^2-4}$

D. $\frac{-x^2+x-6}{x^2-4}$

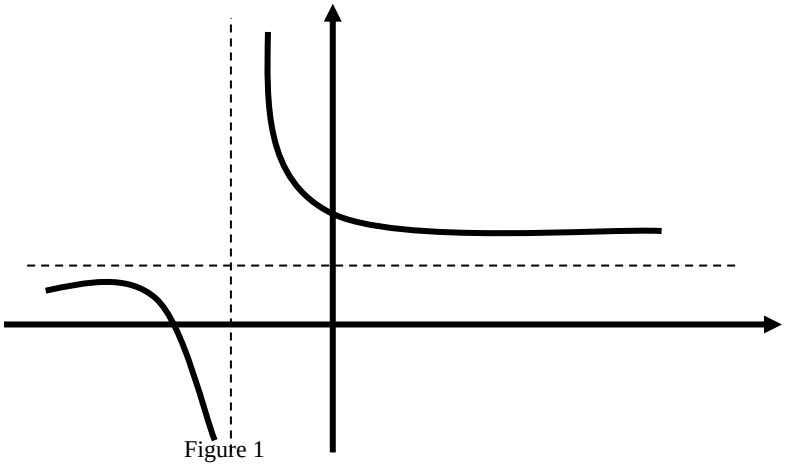


Figure 1

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Grade 11

Unit Two

1. What is the solution set of $\frac{1-\frac{1}{x}}{1-\frac{1}{x^2}} = 3x^2 - \frac{x}{1+\frac{1}{x}}$?

   A. $\left\{-1, \frac{1}{3}\right\}$ B. $\left\{\frac{1}{3}\right\}$ C. $\left\{3, \frac{-1}{3}\right\}$ D. $\left\{\frac{-1}{3}\right\}$

2. Suppose $f(x) = \frac{Q(x)}{x(x^2-1)}$ where Q(x) is a quadratic function. Which one of the following is necessarily true about the graph of f ?

   A. x= 0, x = 1 and x = -1 are the vertical asymptotes of the graph of f .

   B. The graph of f does not intersect with its horizontal asymptote.

   C. The vertical asymptote of the graph of f is only x = -1 if $Q(x) = x^2-x$.

   D. The vertical asymptote of the graph of f is only x = 1 if $Q(x) = 2x^2$.

3. Which one of the following is true about the horizontal asymptote(s) of the graph of $y = \frac{|x|+2}{x}$?

   A. y = 2 is the only horizontal asymptote of the graph.
   B. y = 1 and y = -1 are the horizontal asymptotes of the graph.
   C. y = 2 and y =-2 are th horizontal asymptotes of the graph.
   D. y = 1 is the only horizontal asymptote of the graph.

Maths EUEE 2004 E.C

Grade 11

Unit Three

1. What is the vertex and the equation of the directix, respectively, of the parabola $x + y^2 + 2y + 1 = 0$?

   A. $(0,-1), x = \frac{-1}{4}$ B. $(-1,0), y = \frac{-1}{4}$ C. $(0,-1), x = \frac{1}{4}$ D. $(-1,0), y = \frac{1}{4}$

2. The orbit of Mercury around the sun forms an ellipse with eccentricity 0.206, length of the major axis 1.16 x 108 km and the sun at one focus. Which of the following is the best approximation of the maximum distance from Mercury to the sun?

   A. 7.596×10^7km B. 5.695×10^7km C. 8.695×10^7km D. 6.9995×10^7km

3. If g(x) = $\frac{f(x)}{x+1} + (f(x))^2$, $f(z) = 8 and f'(1) = 2,$ then g' (1) is equal to

   A. 36 B. 31 C. 25 D. 16

4. If x and y are non – negative integers, which of the following is NOT true?

   A. $(\forall x)(\exists y)(y > x^2 - 1)$ C. $(\exists x)(\forall y)(y > x^2 - 1)$

   B. $(\exists y)(\forall x)(y \le x^2 - 1)$ D. $(\exists y)(\exists x)(y \le x^2 - 1)$

Maths EUEE 2005 E.C

Grade 11

Unit Three

1. If a line with angle of inclination of $\frac{3}{4}\pi$ passes through (0,1), which one of the following is the equation of the line?

   A. y = -x + 1 B. y = x+1 C. y = -x -1 D. y = x-1

2. If $x^2-6x+y^2+k = 0$ is equation of a circle with radius w, then what is the value of k?

   A. 13 B. 5 C. 4 D. –4

3. A parabola with focus at (3,-1) has directrix y = 3. Which one of the following is the equation of the parabola?
   A. $(x-3)^2 = -4(y+1)$ C. $(x-3)^2=4(y+1)$
   B. $(x-3)^2=-8(y-1)$ D. $(x-3)^2=8(y-1)$

4. A satellite moves along a hyperbolic curve whose horizontal transverse axis is 24km and an asymptote y = $\frac{5}{12}x + 2$. Then, what is the eccentricity of the hyperbola?
   A. $\frac{5}{13}$ B. $\frac{12}{13}$ C. $\frac{13}{12}$ D. $\frac{15}{3}$

5. For what value of b does the parabola $p(x) = ax^2 + x + b$ pass through the points (-1,5) and (2,-1)?
   A. 9 B. 3 C. -3 D. -15

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Grade 11

Unit Three

1. *What is the distance from the origin to the line that passes through (1,0) and (0,1)?*
   A. $\frac{1}{2}\sqrt{2}$ *B. 1* *C.* $\frac{1}{2}$ *D.* $\sqrt{2}$

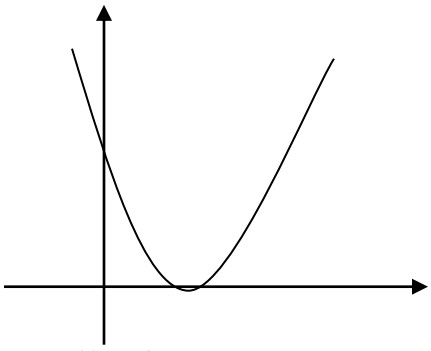
2. *What is the equation of the directrix for the parabola whose equation is* $y^2 + 8x + 6y + 25 = 0$ *?*
   A. y = 3 *B. x = 2* *C. x = 0* *D. x = 4*

3. *If two lines y = x and y = x – 4 are tangent to a circle at (2,2) and (4,0), respectively, then what is the equation of the circle?*
   A. $(x-2)^2 + y^2 = 4$ *C.* $(x-3)^2 + (y-1)^2 = 2$
   B. $(x-4)^2 + (y-2)^2 = 4$ *D.* $(x-1)^2 + ?(y+1)^2 = 10$

4. *A semi-elliptical are over a tunnel for a road through a mountain has a major axis of length 80 meters and a height of 30 meters at the center. What is the equation of the semi-elliptical are over the tunnel, if the center is considered as the origin?*
   A. $\frac{x^2}{6400} + \frac{y^2}{900} = 1$ *C.* $\frac{x^2}{900} + \frac{y^2}{6400} = 1$
   B. $\frac{x^2}{1600} + \frac{y^2}{900} = 1$ *D.* $\frac{x^2}{8100} + \frac{y^2}{6400} = 1$

5. *If the equation* $(x-2)^2 = (y-2)^2 = 1$ *represents a hyperbola, which one of the following represents equation of an asymptote to the hyperbola?*
   A. x = 4 – x *B. x + y = 1* *C. x = 2 – y* *D. x + 2y = 3*

6. *Which of the equations below is represented by the following parabola?*



   A. $y = x^2 + 2$
   B. $y = (2x - 1)^2$
   C. $y = 2(x - 1)^2$
   D. $y = (2x + 1)^2$

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Grade 11

Unit Three

1. Two perpendicular lines ℓ_1 and ℓ_2 are intersecting at (-1,2). If the angle of inclination of ℓ_1 is 45°, then what is the equation of ℓ_2?
   A. y = -x + 3 B. y = x + 3 C. y = -x + 1 D. y = x + 1

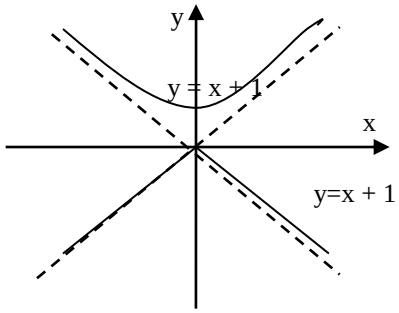
2. The equation of an ellipse with center at (1,4), vertices at (10,4) and (1,2) is:
   A. $4(x-1)^2+81(y-4)^2=324$ C. $9(x-1)^2+4(y-4)^2=4$
   B. $(x-1)^2+9(y-4)^2=4$ D. $2(x-1)^2+9(y-4)^2=4$
3. What is the focus of the parabola $y^2+4y+8x=4$?
   A. (1,2) B. (-1,-2) C. (3,-2) D. (-3,2)
4. Which one of the following is true about a conic section represented by the equation $\frac{x^2}{k}+\frac{y^2}{k-9}=1$?
   A. It is a circle whose center is at origin for some $k \in \Re$.
   B. It is an ellipse whose major axis is vertical when k>9.
   C. It is a hyperbola whose foci are at (-3,0) and (3,0) when 0<k<9.
   D. It is a hyperbola whose foci are at (-3k,0) and (3k,0) when 0<k<9.

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Grade 11

Unit Three

1. Which one of the following is equation of a circle whose center is on y-axis and radius is 3?
   A. $x^2 + y^2 + 6y = 0$ C. $x^2 + (y - 2)^2 = 3$
   B. $(x- 2)^2 + y^2 = 9$ D. $x^2 - 2x + y^2 = 8$
2. The planet Mercury's orbit around the sun is an ellipse with eccentricity 0.206, length of the major axis 1.16×10^8 km and the sun at one focus. What is the maximum distance from Mercury to the sun?
   A. 6.99×10^8 km C. 9.66×10^7 km
   B. 6.99×10^7 km D. 9.66×10^8 km
3. The graph of a hyperbola and the lines of its asymptotes are as shown in the following figure. Which one of the following is an equation of the hyperbola?
   A. $y^2 - 2y - x^2 = 0$
   B. $y^2 - 3y - x^2 = 0$
   C. $x^2 \ (y - 1)^2 = 1$
   D. $(x - 1)^2 - y^2 = 1$



4. The equation of the line that passes through (2, -1) and is perpendicular to 3x + 4y = 6 is:
   A. -4x + 3y = 5 C. 4x = 3y = 11
   B. 4x – 3y = 5 D. -4x + 3y = -11

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Grade 11

Unit Four

1. Suppose proposition $p \Rightarrow \neg 9$ is false (F), which of the following is true?
   A. $\neg \wedge (p \Rightarrow q)$ B. $\neg p \vee (q \Rightarrow \neg p)$ C. $(\neg q \vee p) \Leftrightarrow q$ D. $(p \wedge p) \Leftrightarrow \neg p$
2. Suppose e(x) ≡x is even; p(x) ≡x is prime; d(x) ≡x is divisible by 2. Which one of the following has the truth value F on the set of natural numbers?
   A. $(\exists x)[e(x) \wedge p(x)]$ C. $(\exists x)[e(x) \wedge \neg d(x)]$
   B. $(\forall x)[e(x) \Rightarrow d(x)]$ D. $(\forall x)[e(x) V \neg d(x)]$

3. Consider the following argument from. Production is high if rain continues. Rain does not continue. Therefor, either production is low or rain continues

   Let P: production is low

   q: rain continues

   The following table is also given about p and q.

Rows	p	q	$\neg$ p	$\neg$ q	$\neg p \Rightarrow q$	$q \Rightarrow \neg p$	pVq
1	T	T	F	F	T	F	T
2	T	F	F	T	T	T	T
3	F	T	T	F	T	T	T
4	F	F	T	T	F	T	F

   Which of the following is necessarily true?

   A. The argument form is valid due to row 2.
   B. The argument form is valid due to rows 2 and 3.
   C. The argument form is invalid due to row 4.
   D. The argument form is invalid due to rows 1 and 3

Maths EUEE 2005 E.C

Grade 11

<u>Unit Four</u>

1. Let p,q and r be propositions such that p $\Rightarrow (r \vee \neg q)$ is false. Then, which one of the following propositions is true?

   A. $p \Rightarrow r$ B. $\neg r \Rightarrow q$ C. $\neg p \Leftrightarrow q$ D. $q \Leftrightarrow r$

2. For real numbers x and y, which one of the following statements is true?

   A. $(\forall x)(\exists y)$ ($x^2 + y + 1 = 0$)

   B. $(\exists x)(\forall y)$ ($x^2 + y + 1 = 0$)

   C. $(\exists y)(\forall x)$ ($x^2 + y + 1 = 0$)

   D. $(\forall y)(\exists x)$ ($x^2 + y + 1 = 0$)

3. Consider the following argument:

   "If he does not love her, she will not marry him.

   He loves her. Therefore, she will marry him."

If 'p ≡ He loves her' and 'q ≡ she will marry him,' which one of the following is the correct representation of the argument and its validity?

   A. $\neg p \Rightarrow \neg q, p \mid q$; valid argument

   B. $\neg p \Rightarrow \neg q, p \mid q$; Invalid argument

   C. $p \Rightarrow q, p \mid q$; valid argument

   D. $p \Rightarrow q, p \mid q$; Invalid argument

4. Suppose the following statements are the premises of an argument.

   "He was lazy or he did not like the classroom.

   If he was lazy, he could not pass the exam.

   He passed the exam."

   Which one of the following can be a conclusion that makes the argument valid?

   A. He did like the classroom.
   B. He did not like the classroom.
   C. If he was not lazy, he did like the classroom
   D. He was not lazy and he did like the classroom

Maths EUEE 2006 E.C

Grade 11

<u>Unit Four</u>

1. *if* $(p \vee q) \Rightarrow (\neg r \wedge r)$ *is true, then which one of the following is necessarily true?*

   A. $(p \vee q) \Rightarrow q$ *B.* $\neg r \wedge r$ *C.* $\neg p \Leftrightarrow r$ *D.* $\neg p \vee r$

2. *Which one of the following is a valid logical argument?*

   A. $p \Rightarrow q, q \vdash$p

   B. $p \Leftrightarrow q, p \Rightarrow q \vdash$q

   C. $\neg p \wedge q, q \Rightarrow r \vdash$r

   D. $\neg p, p \vee q, r \Rightarrow q \vdash$r

Maths EUEE 2007 E.C

Grade 11

Unit Four

1. For arbitrary propositions p and q, which one of the following is a valid equivalence?

   A. $\neg(p \Rightarrow q) \equiv (q \Rightarrow p)$ C. $[p \vee \neg q] \equiv [p \Rightarrow q]$

   B. $[\neg(p \Rightarrow q) \wedge p] \equiv (p \wedge \neg q)$ D. $[(p \vee q) \Rightarrow q] \equiv [p \Rightarrow \neg q]$

2. Suppose that p represents the statement *"He missed the tournament.", q represents the statement "He got the gold medal."* And *r* represents the statement *"He took a trip abroad."*. Then which of the following symbolic expression represents the statement: "If he takes a trip abroad and he does not miss the tournament, then he will get the gold medal."?

   A. $(r \Rightarrow q) \wedge \neg p$ C. $(r \wedge \neg p) \Rightarrow q$

   B. $(r \wedge (p \Rightarrow q)$ D. $\neg(r \vee p) \vee q$

3. Which one of the following is NOT a tautology?

   A. $[p \vee (q \Rightarrow r)] \Leftrightarrow [\neg p \Rightarrow (q \Rightarrow r)]$ C. $p \Rightarrow (p \Rightarrow q) \vee q$

   B. $p \vee (q \Rightarrow \neg p)$ D. $[p \Leftrightarrow (q \wedge \neg r)] \Leftrightarrow [\neg p \Leftrightarrow (\neg q \vee r)]$

Maths EUEE 2008 E.C

Grade 11

Unit Four

1. If the truth value of a proposition p is False, then which one of the following compound proposition has a truth value True?

   A. $\neg p \wedge p$ B. $\neg p \Rightarrow p$ C. $\neg(\neg p \vee p)$ D. $p \Rightarrow \neg p$

2. Which one of the following compound propositions is a tautology?

   A. $(q \vee \neg q) \Rightarrow p$ C. $p \vee (q \wedge \neg q)$

   B. $p \Rightarrow (q \vee \neg q)$ D. $p \Rightarrow (q \wedge \neg q)$

Maths EUEE 2004 E.C

Grade 11

Unit Five

1. A school has three classrooms for grade 11, namely 11A, 11B and 11C the number of students in these classrooms is 28,20 and 22 respectively. All the students took and examination and the average score of the students of 11A, 11B and 11C is 60,70 and 70, respectively. What is the average score in this examination for all grade 11 students?

   A. 66 B. 66.67 C. 65 D. 65.67

2. You are given a data on the age of students, in a primary school.

Age	8	10	11	12	13
Number of students	5	15	8	10	2

   Which of the following is NOT true about the data

   A. The median is 10.5 C. The mean is 10.5

   B. The mode is 10 D. The range is 5

3. The following is a table of simple frequency distribution of a data with variable x.

x	1	3	4	5	7
Frequency	2	5	6	5	2

   The standard deviation of the data is equal to:

   A. $\sqrt{3}$ B. 3 C. $\sqrt{2.3}$ D. $\sqrt{3.6}$

4. A three – digited library identification card is to be printed from the numbers 0,1,2,3,4,5 in such a way that the first is non – zero and no number is to repeated. How many such cards can be printed?
   A. 100 B. 120 C. 150 D. 180
5. A student needs to select 3 books from 3 different mathematics, 3 different physics and 1 history book. What is the propballity that one of them is mathematics and the other two are either physics or history books?
   A. $\frac{3}{35}$ B. $\frac{9}{35}$ C. $\frac{15}{35}$ D. $\frac{18}{35}$
6. Items produced by certain company are subjected to two kinds of defects D1 and D2. Out of the total production, if 5% have defect D1 10% have defect D2 and 2% have both defects, then what is the propbality for an item to have defect D2, given that is has defect D1.
   A. 0.2 B. 0.05 C. 0.1 D. 0.4

Maths EUEE 2005 E.C

Grade 11

Unit Five

1. Among students who took a quiz, 15 students scored 6,20 students scored y,10 students scored 8 and 5 students scored 10. What is the average score of the students?
   A. 7.8 B. 7.5 C. 7.2 D. 7.0
2. How many four digit even numbers can be formed from 1,2,3,4 and 5 if the numbers start with 3?
   A. 40 B. 50 C. 100 D. 120
3. The mark that students scored in an examination is grouped in class intervals as shown in the following table.

Class Interval (Mark)	Number of students
55-64	8
65-74	12
75-84	20
85-94	6
95-100	4

   What is the median of the mark?
   A. 25.0 B. 75.5 C. 77.0 D. 79.5
4. A committee consisting of 3 students is to be selected from 10 candidates among which 4 are girls. What is the probability that at least one girl is selected?
   A. $\frac{5}{6}$ B. $\frac{2}{3}$ C. $\frac{1}{3}$ D. $\frac{1}{6}$
5. A box contains 5 white, 6 red and 4 black balls of identical size. If 3 balls are randomly taken out of the box one after the other, what is the propbability that the first ball is white and both the second and third balls are red?
   A. $\frac{2}{15}$ B. $\frac{3}{15}$ C. $\frac{4}{75}$ D. $\frac{5}{91}$

Maths EUEE 2006 E.C

Grade 11

Unit Five

1. *If the list of a measurement is 10, α , 5, α , 5,10,20,15,20,5 with mean $\bar{x}$, then what is the value of α in terms of $\bar{x}$?*
   A. $10\bar{x}$ - 90 B. $9\bar{x}$ – 90 C. $5\bar{x}$ – 90 D. $5\bar{x}$ – 45

2. *The following is the frequency distribution of a grouped data.*

Class Intervals	*Frequency (f)*
3 – 7	*2*
8 – 12	*2*
13 – 17	*10*
18 - 22	*6*

   What is the mean and standard deviation of the distribution, respectively?
   A. 15, $2\sqrt{5}$ B. 15, $\sqrt{7.5}$ C. 12.5, $5\sqrt{2}$ D. 12.5, $\sqrt{15}$

3. *If distinct codes (words) of eight letters are formed by rearranging the letters in the word "ABBEBAYE", how many of the codes begin with B or Y?*
   A. 840 *B. 630* *C. 1680* *D. 420*
4. *A company produced 25,000 bulbs and randomly tested 2% of the product. Among the tested bulbs, if 40 have defect of type D_1, 60 have defect of type D_2 and 25 have both types of defects, what is the probability that a bulb produced by the company has **none** of the defects?*
   A. 0.95 *B. 0.80* *C. 0.85* *D. 0.20*
5. *If S is a set with 10 elements and $A \subseteq S$, what is the probability that A has 3 or more elements?*

A. $\frac{7}{10}$ *B.* $\frac{8}{11}$ *C.* $\frac{121}{128}$ *D.* $\frac{7}{128}$

Maths EUEE 2007 E.C

Grade 11

Unit Five

1. The following is set of data representing the average mark of 13 students: 91, 89, 93, 91, 87, 94, 92, 85, 91, 90, 96, 93, 89. Then which one of the following statements is true about the data?
   A. The median is 90.5. C. The range of the marks is 11.
   B. The upper quartile is 92. D. The mean is 91.5
2. Different codes, each of which consisting of five characters, are to be generated in such a way that the first two characters are any of the English capital letters (A to Z) and the remaining three are any of the digits (0,1,…,9). How many distinct codes can be generated so?
   A. 468,000 B. 260 C. 676,000 D. 26! x 10!
3. A ladder 6m long rests against a vertical wall. If the bottom of the ladder slides away from the wall at a rate (speed) of $\frac{1}{2} m/\sec$, how fast is the angle between the top of the ladder and the wall changing when the angle is $\frac{\pi}{4}$ rad?
   A. $\frac{\sqrt{2}}{12} rad/\sec$ B. $\frac{\sqrt{2}}{2} rad/\sec$ C. $\frac{\sqrt{2}}{6} rad/\sec$ D. $\frac{\sqrt{2}}{3} rad/\sec$
4. A city has two daily newspapers, X and Y. The following information was obtained from a survey of 100 residents of the city: 35 people subscribe to X,60 people subscribe to Y and 20 subscribe to both newspapers. Then how many of the people in the survey do not subscribe to either of the newspapers?
   A. 5 B. 25 C. 40 D. 55
5. A measurement is groped into five class intervals with the following frequency distribution.

Class Interval	5 - 15	15 - 25	25 – 35	35 - 45	45 – 55
55Frequency	22	40	68	50	20

   What are the first quartile Q_1 and the 75^{th} percentile P_{75} of the measurement?
   A. $Q_1 = 20, P_{75} = 40$, C. $Q_1 = 20, P_{75} = 39$
   B. $Q_1 = 22, P_{75} = 40$ D. $Q_1 = 22, P_{75} = 39$
6. Three persons P_1, P_2 and P_3 are firing at a target independently and have a probability 0.7, 0.5 and 0.4, respectively, of hitting the target. What is the probability that at least one of them hits the target?
   A. 0.95 B. 0.85 C. 0.91 D. 0.99

Maths EUEE 2008 E.C

Grade 11

Unit Five

1. The following is a simple frequency distribution of a data with variable X.

X	3	5	6	7
Frequency	2	5	2	1

   What are the mean $(\bar{x})$ and variance Q^2 of the data?
   A. $\bar{x} = 5$, $Q^2 = 0.7$ C. $\bar{x} = 6$, $Q^2 = 0.7$
   B. $\bar{x} = 6$, $Q^2 = 1.4$ D. $\bar{x} = 5$, $Q^2 = 1.4$

2. A box contains 10 items of which 3 are defective. If 2 items are randomly taken out of the box, what is the probability that both items are not defective?

   A. $\frac{7}{10}$ B. $\frac{4}{7}$ C. $\frac{7}{15}$ D. $\frac{49}{100}$

3. Items produced by a certain company are subjected to two kinds of defects D1 and D2. Out of the total product, 5% have the defect D1, 10% have the defect D2, and 2% have both defects. What is the probability that a randomly selected item has neither defect D1 nor defect D2?

   A. 0.13 B. 0.5 C. 0.98 D. 0.87

4. There are three children in a room, ages three, four, and five. If a four-year-old child enters the room then which one of the following is true?

   A. Mean age will stay the same but the standard deviation will increase.
   B. Mean age will stay the same but the standard deviation will decrease.
   C. Mean age and standard deviation will increase.
   D. Mean age and standard deviation will stay the same.

5. In how many more ways can 4 people be arranged in a row than if they were arranged in a circle?

   A. 1 B. 6 C. 18 D. 12

6. Two machines A and B work independently. The probability that both machines A and B work is 0.4. if the conditional probability that machine B works given that machine A works is 0.5, then the conditional probability that machine A works given that machine B works is _____.

   A. 0.8 B. 0.3 C. 0.5 D. 0.7

Maths EUEE 2004 E.C

Grade 11

Unit Six

1. Let A = $\begin{pmatrix} 2 & 0 & x \\ 2y & x+y & -4 \end{pmatrix}$ and B = $\begin{pmatrix} 1 & -y \\ 0 & 3 \\ 1-x & 2 \end{pmatrix}$ Such that $A + 2B^t = 0$

   Then which of the following is the value of y?

   A. 0 B. $-\frac{13}{2}$ C. -8 D. any real number

2. Let A and B be 3 x 3 matrices such that

   A = $\begin{pmatrix} 2 & 0 & 0 \\ 1 & 5 & 0 \\ 0 & -1 & \frac{1}{2} \end{pmatrix}$ and $|B| = \frac{1}{10}$

   Which one of the following is equal to $|2AB^T|$?

   A. 1 B. 4 C. 100 D. 400

3. What is the solution set of the following system of equations

$$\begin{cases} x + y + xz = 1 \\ x + 2y + x = 2 \\ -2x - 2y - 4z = -2 \end{cases}$$

   A. {(0,1,0)} C. $\{(-3k,k+1,k|k \in (-\infty,\infty)\}$

   B. $-\infty,\infty)$ D. $\{(3k,k-1,k|k \in (-\infty,\infty)\}$

Maths EUEE 2005 E.C

Grade 11

Unit Six

1. Suppose A = $\begin{pmatrix}1 & 2\\ 2 & 3\end{pmatrix}$. If X is a 2x2 matrix such that $AX - A^T = 2A$, then what is the value ofX?

   A. $\begin{pmatrix}3 & 1\\ 1 & 3\end{pmatrix}$ B. $\begin{pmatrix}3 & 3\\ 3 & 3\end{pmatrix}$ C. $\begin{pmatrix}3 & 6\\ 6 & 9\end{pmatrix}$ D. $\begin{pmatrix}3 & 0\\ 0 & 3\end{pmatrix}$

2. Suppose that A and B are 3x3 matrices, I is the identity matrix of order 3 such that AB = 2I. If det B = |B| = 6. What is det (A^T)?

   A. $\frac{1}{3}$ B. $\frac{4}{3}$ C. 12 D. 48

3. Consider the system $\begin{cases} ax + y + z = 1 \\ x + 2y + 4z = 0 \\ 5x - y + z = 0 \end{cases}$

   If the determinant of the coefficient matrix is 2, then what is the solution of the system of equations?

   A. $\left(3\alpha \frac{19\alpha}{2}, \frac{-11\alpha}{2}\right)$ C. $\left(\frac{3}{\alpha}, \frac{19}{2}, \frac{11}{2}\right)$

   B. $\left(3, \frac{19\alpha}{2}, \frac{-11}{2}\right)$ D. $\left(\frac{3}{2}, \frac{19}{2}, \frac{-9}{2}\right)$

Maths EUEE 2006 E.C

Grade 11

Unit Six

1. *If* $A = \begin{pmatrix}2 & 0 & -1\\ 1 & 2 & 0\\ 0 & 0 & -1\end{pmatrix}$ *and* $(2A + B)^T = A^TA$*, then which one of the following is equal to B?*

   A. $\begin{pmatrix}1 & 0 & -2\\ 2 & 0 & 0\\ 0 & 0 & 4\end{pmatrix}$ *B.* $\begin{pmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{pmatrix}$ *C.* $\begin{pmatrix}8 & 0 & -4\\ 4 & 8 & 0\\ 0 & 0 & -4\end{pmatrix}$ *D* $\begin{pmatrix}1 & 2 & 0\\ 0 & 0 & 0\\ -2 & 0 & 4\end{pmatrix}$

2. *If* $M = \begin{pmatrix}0 & 1 & 2\\ 3 & -1 & 0\\ 5 & 2 & 4\end{pmatrix}$ *and* $A^TM=2I$*, where A is a 3x3 matrix and I is the identity matrix of order 3, then what is det (A)?*

   A. 0.2 *B.* $\frac{4}{17}$ *C. 0.8* *D.* $\frac{1}{17}$

3. *What should be the value of K so that the system of equation*

   $\begin{cases} x - y + z = 1 \\ -x + 5y - 4z = 1 \\ 2x + 2y - z = k \end{cases}$ *has a solution?*

   A. 0 *B. 1* *C. -4* *D. 4*

4. *Suppose AX = b, where A is a 3 x 3 matrix,* $b = (b_1,b_2,b_3)^T$ *and* $X = (x,y,z)^T$*. which one of the following is necessarily true about this system of linear equations?*

   A. The system has a solution only when det (A) $\neq$ *0.*

   B. The Cramer's rule is suitable to solve the system if two rows of A are identical.

   C. If det (A) $\neq$ *0 and the second column of A is a multiple of b, then x = 0.*

D. If b = 0, then X = $(0,0,0)^T$ is the only solution of the system.

Maths EUEE 2007 E.C

Grade 11

Unit Six

1. If $A=\begin{pmatrix}3 & -2 & 8\\ 0 & 6 & 7\\ 0 & 4 & 5\end{pmatrix}$, then det ($A^TA$) is equal to _____

   A. 12 B. 36 C. 30 D. 15

2. If $\begin{pmatrix}0 & x & 0\\ 1 & -1 & 1\\ 0 & y & -1\end{pmatrix}$ and $A^{-1}=\begin{pmatrix}1 & 1 & 1\\ 3 & 0 & 0\\ 2 & 0 & -1\end{pmatrix}$, then what are the values of x and y?

   A. x = 3, y = -2 C. x = -3, y = 2

   B. $x=\frac{2}{3}, y=\frac{1}{3}$ D. $x=\frac{1}{3}, y=\frac{2}{3}$

3. Consider the following system of equations: $\begin{cases}ax+by=2\\ x+3y+2z=0\\ 2x+y+z=0\end{cases}$

   If the determinant of the coefficient matrix is 2, then what is the solution set of the system?

   A. {(1,3,-5)} C. {(-2,-6,10)}

   B. $\left\{\left(\frac{1}{a},\frac{1}{b},0\right)\right\}$ D. ϕ

4. What is the solution set of the system $\begin{cases}x+y-z=1\\ x+2y=3z=1\\ 2x+3y-4z=2\end{cases}$?

   A. {(0,2,1)} C. {(2k+1,-k,k)|k$\in\Re$}

   B. {(1-k,2k,k)|k$\in\Re$} D. ϕ

Maths EUEE 2008 E.C

Grade 11

Unit Six

1. If A = $\begin{pmatrix}2 & 7\\ 1 & 3\end{pmatrix}$ and B^{-1} = $\begin{pmatrix}1 & 1\\ 0 & 2\end{pmatrix}$, then $(AB)^{-1}$ is equal to:

   A. $\begin{pmatrix}4 & -3\\ 4 & -5\end{pmatrix}$ B. $\begin{pmatrix}-2 & 5\\ 2 & -4\end{pmatrix}$ C. $\begin{pmatrix}-3 & 11\\ 1 & -3\end{pmatrix}$ D. $\begin{pmatrix}4 & 0\\ 0 & 2\end{pmatrix}$

2. Let A = $\begin{pmatrix}0 & \alpha & \beta\\ 2 & 2 & 1\\ 3 & 1 & 2\end{pmatrix}, b=\begin{pmatrix}6\\ 0\\ 0\end{pmatrix}$, and x= $\begin{pmatrix}x\\ y\\ z\end{pmatrix}$. If det(A) = 3, then what is the solution set of the system AX = b?

A. $\{(6,-2,-8)^T\}$ B. $\left\{\left(0,\frac{1}{a},\frac{5}{b}\right)^T\right\}$ C. $\{(-3,1,4)^T\}$ D. ϕ

3. For any $n \times n$ square matrix A, which one of the following is true?
   A. Det(A) = -det (A^T), where A^T is the transpose of A
   B. If k is a scalar, then det (kA) = K^n det (A)
   C. If B is a matrix obtained from A by interchanging of two rows of A, then det (B) = det (A)
   D. If A is invertible, then det (A) = det (A^{-1})
4. The solution of the system of linear equation of

$$\begin{cases} x-3x-2z=6 \\ 2x-4y-3z=8 \\ -3x+6y+8z=-5 \end{cases}$$ is:

A. X = -1, y = -3, z = -2 C. x = 1, y = -3, z = 2
B. X = -1, y = -3, z = 2 D. x = 1, y = 3, z = -2

Maths EUEE 2004 E.C

Grade 11

<u>Unit Seven</u>

1. $\begin{pmatrix} a & 2 & \beta \\ 2 & 1 & 3 \\ -1 & 0 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} -5 \\ 5 \\ 0 \end{pmatrix}$ and the determinant of the coefficient matrix is -5, then the value of x is equal to

A. 3 B. a + β C. -5 α D. 5

2. In the set of complex numbers, the solution set of x2 – 2x + 5 = 0 is

A. Ø B. {2 + I, 2-i} C. {1+2i,I-2i} D. {2+4i,2-4i}

3. Which of the following is the simplest form of $\frac{4-3i}{3+4i}+\overline{1-2i}$?

A. 1+i B. 1+3i C. 2-i D. I – 3i

4. Let z be a complex number. Which of the following is the solution set of z^3 –iz = 0?

A. $\left\{\pm\frac{1}{\sqrt{2}}(1+i)\right\}$ B. $\left\{\pm\frac{1}{\sqrt{2}}(1-i)\right\}$ C. $\{\pm\sqrt{2}(1-i)\}$ D. $\left\{0,\pm\frac{1}{\sqrt{2}}(1+i)\right\}$

Maths EUEE 2005 E.C

Grade 11

<u>Unit Seven</u>

1. If z = cos $(\frac{\pi}{10})+i\sin(\frac{\pi}{10})$, then what is the value of z^5?

A. $\frac{\pi}{2}+\frac{\pi}{2}i$ B. $\frac{1}{2}+\frac{1}{2}i$ C. i D. 1+i

2. Which one of the following is the simplest form of |3+4i|- $\frac{25i}{3+4i}$?

A. 5-5i B. 5+5i C. 1-3i D. 1-3i

3. In the set of complex numbers, which one of the following is the solution set of $z^3 – iz^2 + 2z = 0$?

A. {0} B. {0,-i} C. {0,-i,2i} D. {0,i,-2i}

Maths EUEE 2006 E.C

Grade 11

Unit Seven

1. *If z = x + yi is a complex number, then* $|z|^2 + \frac{1}{2}(z-\bar{z})^2 = 1$ *is equivalent to which one of the following equations?*

   A. $x^2 - y^2 = 1$ *B.* $x^2 - 3iy^2 = 1$ *C.* $x^2 - y^2 = 2$ *D.* $2x^2 - y^2 = 2$

2. *if* $w = \frac{16i}{1+i} + (1-3i)^2$ *and* $z = |w| + \overline{w}$*, which one of the following is the simplest form of z?*

   A. $\sqrt{2} + 2i$ *B. 2 + 2i* *C. 4 – 2i* *D. 2 – 2i*

Maths EUEE 2007 E.C

Grade 11

Unit Seven

1. If $z = \frac{3+i}{i-2}$ is a given complex number, then what is the conjugate, $\bar{z}$ of z?

   A. $\bar{z} = \frac{-3+i}{2+i}$ C. $\bar{z}$ = -6 - 2i

   B. $\bar{z} = \frac{i-3}{2-i}$ D. $\bar{z}$ = -1 – i

2. What is the principal argument of $(5+5i)^{11}$?

   A. $\frac{\pi}{2}$ B. $\frac{2\pi}{3}$ C. $\frac{\pi}{4}$ D. $\frac{3\pi}{4}$

3. What are the values of *u* and *v* that satisfy the equation:

   $\frac{u+3i}{4-2i} = \frac{2+vi}{20}$?

   A. u = 2, v = 3 C. u = 2 , v = 16

   B. u = -6, v = 10 D. u = -4, v = 6

Maths EUEE 2008 E.C

Grade 11

Unit Seven

1. In the set of complex numbers, what is the solution set of $x^2 + 4x + 5 = 0$?

   A. ϕ B. $\{1-2i, 1+2i\}$ C. $\{2-i, 2+i\}$ D. $\{-2-i, 2+i\}$

2. If $z = (1+i)^{10}$, then which of the following is equal to z?

   A. $1+32i$ B. $32i$ C. $10i$ D. $1+10i$

3. If $Z = \frac{2-4i}{1+i}$ then the modulus of the conjugate of Z, $|\bar{z}|$ is:

   A. $\sqrt{10}$ B. $3\sqrt{2}$ C. $2\sqrt{3}$ D. $2\sqrt{2}$

Maths EUEE 2004 E.C

Grade 11

Unit eight

1. Line 1 passes through (0,5) and (-5,0). What is the angle between the y – axis and 1 in radian measure?

   A. $\frac{\pi}{4}$ B. $\frac{\pi}{3}$ C. $\frac{\pi}{2}$ D. $\frac{3}{4}\pi$

2. Which of the following is a vector that lies on the line through (0,0) and (2,4)?

   A. $\vec{u} = (2,1)$ B. $\vec{u} = (-1,-2)$ C. $\vec{u} = (\frac{1}{2},-2)$ D. $\vec{u} = (-2,-6)$

3. Let i and j be the standard unit vectors in the directions of positive x- axis and positive y – axis, respectively, and $\overline{AB}$ be a vector from the point A(-1,0) to the point B(2,2). If $\overline{Y}$ = 3 $\overline{AB}$ -3i + 2j, then the unit vector in the direction of $\overline{V}$ is equal to

   A. $\left(\frac{3}{5},\frac{4}{5}\right)$ B. $\left(\frac{3}{5},\frac{4}{5}\right)$ C. $\left(\frac{-3}{5},\frac{4}{5}\right)$ D. $\left(\frac{3}{5},\frac{4}{5}\right)$

4. Which of the following is a vector equation of the line tangent of the circle $x^2 + y^2 + 2x - 7 = 0$ at (1,2)?

   A. (x,y) = (0,3) + λ (-1,2) C. (x,y) = (0,3) + λ (1,-1)

   B. (x,y) = (1,2) + λ (2,-1) D. (x,y) = (1,3) + λ (-1,2)

5. Let be the line whose equation is 2x – y = 10. Which one of the following is the equation of the following is the equation of the image of after a reflection in the line y = 2x – 5 followed by a rotation through the angel of 90° about the origin?

   A. X + 2y = 0 B. 2x + y = 0 C. x + 2y = 5 D. x-2y=5

Maths EUEE 2005 E.C

Grade 11

<u>Unit eight</u>

1. A line given by a vector equation r(t) = (0,3) +t(1,1) is tangent to a circle at point (0,3). If the radus of the circle is $\sqrt{2}$, which one of the following is the center of the circle?

   A. (1,4)B. (1,-4) C. (-1,2) D. (1,2)

2. If $\vec{u} = (-3,x) and \vec{V} = (x,y-2)$ are vectors, what is the value of y so that $\vec{u} + \vec{v} = 3\vec{u} - \frac{1}{2}\vec{v}$?

   A. $\frac{2}{3}$ B. $-\frac{10}{3}$ C. -4 D. $-\frac{22}{3}$

3. Which one of the follooiwng is necessarily true?

   A. If $\left\|\vec{A}\right\| = \left\|\vec{B}\right\|$, then $\vec{A} = \vec{B}$.

   B. $\left\|K\vec{A}\right\| = K\left\|\vec{A}\right\|$, for any real number k.

   C. If $\vec{A}$ is parallel to $\vec{B}$, then $\vec{A}.\vec{B}$ = 0

   D. If $\vec{u}$ is a unit vector in the direction of $\vec{A}$, then $\vec{A}.\vec{u} \equiv \left\|\vec{A}\right\|$

4. If $\vec{A}$ is perpendicular to $\vec{B}$, what is the cosine of the angle between $\vec{A}$ and $\vec{A} - \vec{B}$?

   A. $\frac{\left\|\vec{A}-\vec{B}\right\|}{\left\|\vec{A}\right\|}$ B. $\frac{\left\|\vec{A}\right\|}{\left\|\vec{A}-\vec{B}\right\|}$ C. $\frac{\left\|\vec{A}-\vec{B}\right\|}{\left\|\vec{B}\right\|}$ D. $\frac{\left\|\vec{B}\right\|}{\left\|\vec{A}-\vec{B}\right\|}$

5. What is the image of the ellipse whose equation is $2(x+2)^2+(y-1)^2=2$ under a translation that takes (2,1) to (4,0) followed by a rotation of 90°?

   A. $X^2 + 2y^2 = 2$ C. $2(x-4)^2 + y^2 = 2$

   B. $2x^2 + y^2 = 2$ D. $(x-4)^2 + 2y^2=2$

Maths EUEE 2006 E.C
Grade 11
<u>Unit eight</u>

1. *Suppose* $\vec{A} = 2\vec{i} - \vec{j} + 2\vec{k}$ *and* $\vec{B}$ *is a vector in space such that* $\left|\vec{B}\right| = \vec{A}.\vec{B}$. *If* $\vec{U}$ *is the unit vector in the direction of* $\vec{B}$, *then* $\left|\vec{A} + \vec{U}\right|^2$ *is equal to:*

   A. 16 B. 12 C. 10 D. 14

2. *What is the image of the line given by (x,y) = (-1,0) + t(3,6),t∈R, under the translation that takes (1,0) to (0,1) following by the reflection about the line y = 2x?*

   A. y = 2x + 3 B. y = 2x – 3 C. y = 2x + 6 D. y = 2x – 5

3. *Suppose* $\vec{A} = 3\vec{i} - 4\vec{j}$ *and* $\vec{B}$ *is a vector in the xy=plane such that the angle between* $\vec{A}$ *and* $\vec{B}$ *is* $\frac{\pi}{3}$. *If* $\vec{U}$ *is the unit vector in the direction of* $\vec{B}$, *then* $\vec{A}.(\vec{A} - 2\vec{U})$ *is equal to:*

   A. 20 B. 5 C. 15 D. 30

4. *Let the equation* $x^2 + 2x + y^2 = 8$ *represents a circle. Then which one of the following lines cut the circle at exactly two points?*

   A. 4x + 3y + 19 = 0 C. 2y = 5x + 43
   B. 3x + 4y + 14 = 0 D. 2x = y – 50

5. *If* ℓ *is the line passing through (0,2) and parallel to* $V = \vec{i} + 3\vec{j}$, *which one of the following is true about* ℓ *and the circle* $(x-2)^2 + (y-1)^2 = 5$?

   A. ℓ *is tangent to the circle at (0,2)*
   B. ℓ *is tangent to the circle at some point p, where p* $\neq$ *(0,2)*
   C. *Intersects the circle at two distinct points.*
   D. *The distance between* ℓ *and the center of the circle is greater than* $\sqrt{5}$

6. *If a translation T take the circle* $x^2 + y^2 - 2x + 6y + 3 = 0$ *into the circle whose equation is* $(x+2)^2 + (y-4)^2 = 7$, *then what is the image of the origin under T?*

   A. (-3,7) B. (1,2) C. (1,-3) D. (-2,4)

7. *If A(-2,3), B=)3,1) and C is any other point on the plane, then which one of the following is the coordinate from of* $\overrightarrow{AC} - \overrightarrow{BC}$ *?*

   A. (-5,2) B. (5,-2) C. (1,4) D. (-1,-4)

8. *What is the equation of a line that passes through the point (-1,2) and parallel to a the vector (1,-1)?*

   A. 2x – y = 1 B. x + y – 1 = 0 C. x – 2y = 3 D. y – 2x + 1 = 0

Maths EUEE 2007 E.C

Grade 11

Unit eight

1. If $\vec{A} = 4\vec{i} - 3\vec{j}$ and $\vec{u}$ is a unit vector such that $|\vec{A} + \vec{u}|^2 = 27$, then the cosine of the angle between $\vec{A}$ and $\vec{u}$ is equal to _____

   A. 0.1 B. 0.2 C. 0.3 D. 0.4

2. If A=(1,-2), B=(-3,2) and $\vec{V}$ is a position vector such $2\vec{V} + \overrightarrow{AB} = \vec{0}$, then $\vec{V}$ is equal to _____.

   A. (2,0) B. (-1,0) C. (-2,2) D. (2,-2)

3. What is the image of the ellipse $(x-1)^2+4y^2=1$ under the translation that takes (1,1) to (0,2) followed by the reflection through the x-axis?

   A. $x^2+4(y-1)^2=1$ C. $x^2+4(y+1)^2=1$
   B. $4x^2+(y-1)^2=1$ D. $4x^2+(y+1)^2=1$

Maths EUEE 2008 E.C

Grade 11

Unit eight

1. If $\vec{V} = \overrightarrow{AB} + 3\overrightarrow{BA}$, where A and B are distinct points in the coordinate plane, then which one of the following is equal to $3\vec{V}$?

   A. $6\overrightarrow{AB}$ B. $-6\overrightarrow{AB}$ C. $12\overrightarrow{AB}$ D. $-12\overrightarrow{AB}$

2. If $\vec{u}$ is a unit vector in the direction of $\vec{A}$ and $\left|\vec{A}=4\right|$, then $\vec{A}.\vec{u}$ is equal to _____.

   A. $\frac{1}{4}$ B. 4 C. $\frac{1}{2}$ D. 2

3. If $\vec{A}$ and $\vec{B}$ are parallel vectors with opposite directions and $\left|\vec{B}\right|=\left|2\vec{A}\right|$, is equal to:

   A. $\vec{A}$ B. $-\vec{A}$ C. $-3\vec{A}$ D. $3\vec{A}$

4. The image of a figure with vertices A(1, 2), B(3, 6), C(-1, 2), and D(-2,-2) after reflection across the x-axis is:
   A. $A'(1,-2), B'(-3,-6), C'(1,-2), and D'(2,2)$
   B. $A'(-1,-2), B'(-3,6), C'(1,-2), and D'(2,-2)$
   C. $A'(1,-2), B'(3,-6), C'(-1,-2), and D'(-2,2)$
   D. $A'(1,-2), B'(3,6), C'(-1,2), and D'(-2,-2)$

5. What is the value k, for which the two vectors $\vec{u}=\begin{pmatrix}1\\k\\-3\end{pmatrix}$ and $\vec{v}=\begin{pmatrix}2k\\-5\\4\end{pmatrix}$ are perpendicular?

   A. 4 B. -4 C. 3 D. -3

Maths EUEE 2004 E.C

Grade 11

<u>Unit Nine</u>

1. If f(x) = $\frac{x-1}{(x-2)^2(x+1)}$, which of the following is true about f?
   A. Its graph has an oblique asymptot
   B. The graph of f does of meet its asymptote
   C. As x $\rightarrow 1^+$, f(x) $\rightarrow -\infty$
   D. As x $\rightarrow 2^-$, f(x) $\rightarrow -\infty$

2. Which one of the following is a simplified form of csc $(\frac{\pi}{2}-x)$ cos x – $\sin^2 x$?

   A. 2cos x B. $\cos^2 x$ C. 2sinx D. $\sin^2 x$

3. $\cos(\tan^{-1}(0,5))$ is equal to:

   A. $\frac{1}{\sqrt{5}}$ B. $\frac{1}{\sqrt{3}}$ C. $\frac{2}{\sqrt{3}}$ D. $\frac{2}{\sqrt{3}}$

4. A patrol boat on a sea sailed from its station 10km to the south and there changed its course and sailed 5+ $\sqrt{6}$ km in the direction N 60°E. then, what is the distance the boat should travel in order to return to its station by the shortest route?

   A. $4\sqrt{6}$ km B. 9km C. $3\sqrt{6}$ km D. 7km

Maths EUEE 2005 E.C

Grade 11

<u>Unit Nine</u>

1. What is cot (acrsin x) if 0<x<1?

   A. $\frac{x}{\sqrt{1-x^2}}$ B. $\frac{1}{x}\sqrt{1-x^2}$ C. $\sqrt{1-x^2}$ D. $\frac{1}{\sqrt{1-x^2}}$

2. If f(x) = 2 - $\frac{1}{2}\sin(\frac{\pi}{2}x)$, then which one of the following is the amplitude and period of f, respectively?

A. $\frac{1}{2} and 4$ B. $\frac{-1}{2} and 4$ C. 2 and π D. $\frac{1}{2} and \pi$

3. Which one of the following is equal to sec $(\frac{\pi}{2} - x)\sin^3 x + \cos 2x$

A. 2cosx B. 2sinx C. $\cos^2 x$ D. $\sin^2 x$

4. What is the solution set of $\cos 2x + \frac{1}{2} and 2x = 1$ in the interval $[0, 2\pi)$?

A. $\left\{0, \frac{\pi}{4}, \pi, \frac{5\pi}{4}\right\}$ B. $\left\{0, \frac{\pi}{4}, \frac{3\pi}{4}, \pi\right\}$ C. $\{0, \pi\}$ D. $0, \frac{\pi}{4}, \pi$

Maths EUEE 2006 E.C

Grade 11

Unit Nine

1. *If $\theta = 2 \arctan\left(\frac{1}{2}\right)$, then which one of the following is equal to sec θ?*

A. $\frac{25}{3}$ *B.* $\frac{4}{5}$ *C.* $\frac{5}{3}$ *D.* $\frac{5}{4}$

2. *If a point (2,5) is reflected under a line to the point (-3,1), what is the line of reflection?*

A. 2x + 3y = 7 *B. x + 3y =7* *C. 8y + 10x = 19* *D. 2x + 3y + 5 = 0*

3. *Suppose that an airplane is descending at a speed of 50 miles per hour at an angle of 30° below the horizontal line. What is the x- and y-components, respectively, of the velocity of the plane?*

A. $50\sqrt{3}, 25$ *B.* $-25, 50\sqrt{3}$ *C.* $25, -25\sqrt{3}$ *D.* $-25\sqrt{3}, -25$

4. *An observer on level ground is at a distance $10\sqrt{3}$ m from a building. The angles of elevation to the bottom of the windows on the second and third floors at 30° and 60°, respectively. What is the distance h between the bottom of the windows?*

[You may use the values; sin 30° = cos 60° = $\frac{1}{2}$ and sin 60° = cos 30° = $\frac{\sqrt{3}}{2}$]

A. 15m *B. 20m* *C. 15 $\sqrt{3}$ m* *D. 32m*

Maths EUEE 2007 E.C

Grade 11

Unit Nine

1. What is the possible value of x that solves the equation:

$\sin^{-1} x + \cos^{-1}\left(\frac{3}{5}\right) = \pi$?

A. $\frac{\pi}{3}$ B. $\frac{3}{5}$ C. $\frac{5\pi}{2}$ D. $\frac{4}{5}$

2. What is the work done (in Joules) when a force of 50 Newton used to pull a crate 20 meters along a level path if the force is an angle of 60°?
[Remember that: Work = (Force) x (distance travelled)].

A. 360 B. 500 C. 760 D. $1500\sqrt{2}$

3. What is the amplitude and period, respectively, of the graph of f(x)=-6 sinx. cosx?

A. $3, \pi$ B. $6, \pi$ C. $3, \frac{\pi}{2}$ D. $6, 2\pi$

4. If angle θ is an acute angle of a right triangle, what is the length of the side adjacent to θ, given that the hypotenuse has 6 units length and sec θ = 10/3?
   A. 1.8 units B. 2 units C. 18 units D. 20 units
5. Two ships, one with angle of depression 60° due east and the other with 30° due west are observed from a plane 1,000 meters above a sea. If the two ships are on the same line, what is the distance between the two ships?
   [you may use the values: sin 30° = cos 60° = ½ and sin 60° = cos 30°]

A. $\frac{1}{\sqrt{3}}4{,}000$ m B. 2,000 m C. $\sqrt{3}$ 500 m D. $\frac{1}{\sqrt{3}}600$ m

Maths EUEE 2008 E.C

Grade 11

Unit Nine

1. If $\cos(\theta) = 2$, then which of the following is equal to $\csc(\theta)$?
   A. $\sqrt{5}$ B. $\frac{2}{\sqrt{5}}$ C. $\frac{1}{\sqrt{5}}$ D. $\frac{1}{2}$
2. What is the amplitude and period, respectively, of the graph of $f(x) = 4\sin\left(\frac{x}{3}\right)\cos\left(\frac{x}{3}\right)$?
   A. 4, $\frac{\pi}{3}$ B. 2, 3π C. 2, $\frac{2\pi}{3}$ D. 4, 3π
3. A boat on a sea sailed from its station toward North with constant speed of 80 km/h. another boat from the same station sailed 600 NE (North East) with constant speed of 100 km/h. if the two boats started sailing at the same time, what is the straight distance between them after they have sailed for just 30 minutes?
   A. $10\sqrt{42}km$ B. 90 km C. $10\sqrt{41}km$ D. $10\sqrt{21}km$
4. What is the value of arcs in $\left(-\frac{\sqrt{2}}{2}\right)$?
   A. $\frac{\pi}{4}$ B. $\frac{\pi}{2}$ C. $-\frac{\pi}{4}$ D. $-\frac{\pi}{2}$

Maths EUEE 2004 E.C

Grade 12

Unit One

1. Let $a_n = n + \cos n\pi, n = 1,2,3...$ be the nth term of a sequence. Then which of the following is true?
   A. The fifth term is 6
   B. The 10th term is 9
   C. $a^7 + a^8 = 15$
   D. $a^7 + a^6 = 1$
2. If $\{A_n\}$ is an arithmetic sequence with first term $A_1 = 5$ and fifthe term A5 = 21, then the partial. Sum $\sum_{n=1}^{20} A_n$ is equal to
   A. 760 B. 780 C. 860 D. 870

3. What is the sum of the series $\sum_{n=0}^{\infty} 2'3^{2-n}$ >

A. 6 B. 18 C. 27 D. ∞

4. A business association gets a net profit of Birr 3,000 at the end of month. Just after the fifth year, its amount was Birr 230,000. What the starting amount of the business?

A. Birr 47,000 B. Birr 50,000 C. Birr 53,000 D. Bir $56{,}0003^{20}$-1

Maths EUEE 2005 E.C

Grade 12

Unit One

1. What is the 50^{th} term of the sequence 3,10,17,24,31…?

A. 310 B. 346 C. 510 D. 531

2. If $\{a_n\}$ is a sequence such that $a_1 = 2$, and $a_{n+1} = a_n + 4$ for all $n \geq 1$, then $\sum_{n=1}^{35} a_n$ is equal to:

A. 2460 B. 2458 C. 2450 D. 2442

3. What is the sum of the series $\sum_{n=1}^{\infty} \frac{2^{2n+1}}{5^{n-1}}$?

A. 40 B. 20 C. 10 D. 8

4. The population of certain country is currently 80 million with growth rate 0f 2% per year.

Given: $(0{,}02)^9 = 5.12 \times 10^{-16}$,	$(1.02)^9 = 1.19$
$(0.02)^{10} = 1.024 \times 10^{-17}$,	$(1.02)^{10} = 1.22$

Which one of the following is the best approximation of the population after 10 years?

A. 81.9 million B. 86.8 million C. 95.2 million D. 97.6 million

Maths EUEE 2006 E.C

Grade 12

Unit One

1. Which one of the following represents a geometric sequence?

A. $3,1,\frac{1}{3},\frac{1}{9},\frac{1}{27},\ldots$ *C. 1,3,6,10,15,…*

B. $\frac{1}{2},\frac{1}{3},\frac{1}{4},-\frac{1}{5},\frac{1}{6},\ldots$ *D. -3,6,-9,12,-15,…*

2. What is the actual value of the sum $\sum_{n=1}^{\infty}\left(\frac{2^n+5^n}{10^n}\right)$*?*

A. 0.325 *B. 1* *C.* $\frac{5}{4}$ *D.* $\frac{37}{9}$

3. What is the sum of the series $\sum_{n=1}^{\infty}(-1)^n 3^{-2n}$

A. $\frac{-1}{8}$ *B. -0.13* *C. -0.1* *D.* $\frac{1}{8}$

Maths EUEE 2007 E.C

Grade 12

Unit One

1. Which one of the following is an arithmetic sequence?
   A. 3, 5, 7, 9, 11…
   B. 3, 6, 12, 24, 48…
   C. -3, 6,-9, 12,-15…
   D. 1, 3, 6, 10, 15, 21…

2. Which one of the following sequence is a convergent sequence?
   A. $1,\frac{1}{2},1,\frac{1}{3},1,\frac{1}{4},...$
   B. $\{(-1)^n\}_{n=1}^{\infty}$
   C. $\left\{10^{109}-\frac{1}{100}n\right\}_{n=1}^{\infty}$
   D. $\left\{\sin\left(\frac{1}{n}\right)\right\}_{n=1}^{\infty}$

3. A certain meeting hall has 20 rows of seats. There are 20 seats in the first row, 22 seats in the second row, 24 seats in the third row, and so on. How many seats are there on the last (20^{th}) row of the hall?
   A. 46 B. 58 C. 760 D. 5240
4. A ball is thrown vertically from ground up to a height of 16m. Each time it drops h meters, it rebounds 0.80h m. Nothing that the ball travels every height of h twice, what is the total vertical distance travelled by the ball before it comes to rest?
   A. 40m B. 80m C. 160m D. 320m
5. What is the sum of all multiples of 3 between 20 and 200?
   A. 7,227 B. 6,570 C. 6,150 D. 5,166

Maths EUEE 2008 E.C

Grade 12

Unit One

1. If $\{A_n\}_{n=1}^{\infty}$ is an arithmetic sequence such that its 1^{st} term A_1 = -5 and its 5^{th} term A_5 =15, then its 11^{th} term A_{11} is equal to:
   A. 40 B. 50 C. 45 D. 55
2. What is the sum of all multiples of 4 that are between 30 and 301?
   A. 12,882 B. 11,288 C. 6,288 D. 6,882
3. If $f: A \to B$ and $g: B \to C$ are functions, then which one of the following is true about the composition function?
   A. Domain of $(gof) \subseteq$ Domain of f
   B. Range of $(gof) \not\subset$ Range of g
   C. Domain of $(gof) \not\subset$ Domain of f
   D. Range of $(gof) \subseteq$ Range of f
4. The nth term of the sequence: 1, -4, 9, -16, . . . is:
   A. $a_n = (-2)^n$
   B. $a_n = (-1)^n n^2$
   C. $a_n = (-1)^{2n} n^2$
   D. $a_n = (-1)^{n-1} n^2$
5. The sum of $\sum_{n=0}^{\infty} 5\left(\frac{2}{3}\right)^n$ is _____.
   A. 0 B. 15 C. $\frac{10}{3}$ D. 5

Maths EUEE 2004 E.C
Grade 12
Unit Two

1. To which of the following is $\lim_{n\to\infty}\frac{3\sqrt{n}-6n+5}{4n+1}$?

   A. $\frac{-3}{2}$ B. 0 C. $\frac{3}{4}$ D. $\frac{5}{4}$

2. To which of the following is $\lim_{n\to 1^-}\frac{x^4-1}{/x-1/}$ equals to?

   A. 4 B. 0 C. - D. -4

3. Let f(s) = $\begin{cases}\frac{a}{x^2+3}, if x\le 1\\ \frac{x-1}{\sqrt{x}-1}, if x>1\end{cases}$

   What is the value of a if f is continuous at x = 1?

   A. 0 B. 2 C. 4 D. 8

4. $\lim_{n\to\infty}\left(1+\frac{1}{x}\right)^{2x+4}$ is equal to:

   A. e B. e^2 C. e^4 D. ∞

Maths EUEE 2005 E.C
Grade 12
<u>Unit Two</u>

1. If $f(x)=x^2+2\ell nx$, then what is $\lim_{h\to 0}\frac{f(2+h)-f(2)}{h}$?

   A. 5 B. 4 C. 2 D. 0

2. What is the value of $\lim_{h\to\infty}\left(1+\frac{1}{x}\right)^{\frac{-x}{2}}$?

   A. $\frac{1}{\sqrt{e}}$ B. $\sqrt{e}$ C. e^{-2} D. ∞

3. Which one of the following is equal to $\lim_{h\to\infty}\frac{1-n-3n^2}{6n^2+1}$?

   A. $\frac{1}{6}$ B. $\frac{-1}{2}$ C. $\frac{-1}{6}$ D. $-\infty$

4. Let $f(x)=\begin{cases}3^x+k, if x\le 0\\ 3\frac{\sin(2x)}{x}, if x>0\end{cases}$

   If f is continuous at x = 0, then what is the value of k?

   A. 6 B. 5 C. 2 D. 0

5. Which one of the following is equal to $\lim_{h\to 1}\frac{\sqrt{x}-1}{x^2-1}$?

   A. ∞ B. $\frac{1}{2}$ C. $\frac{1}{4}$ D. 0

6. Which one of the following is equal to $\lim_{h\to 1}\dfrac{1-x}{1-\dfrac{1}{x}}$?

A. 1 B. 0 C. $\dfrac{-1}{2}$ D. Doesn't exist

Maths EUEE 2006 E.C
Grade 12
Unit Two

1. *Which of the following expression is a polynomial expression?*

A. $x^2 - 3x + \sin x$ *C.* $\dfrac{2+\pi}{1+\pi^2}$

B. $\dfrac{4x^3+12x^2-x}{\pi x^2}$ *D.* $2-3x^{2/3}+7x^{5/2}+3x^{-1}$

2. *The sequence* $\left\{\dfrac{(n-1)(2n+1)}{1-n^2}\right\}_{n=1}^{\infty}$ *converges to:*

A. $-\infty$ *B. -2* *C. 0* *D. 1*

3. *Given that* $\lim_{x\to 3}\left(\dfrac{(f(x)-g(x))(g(x)-2f(x))}{g(x)^2-f(x)^2}\right)$*?*

A. $-\dfrac{66}{96}$ *B.* $-\dfrac{1}{16}$ *C. 0* *D. does not exist*

4. *Let* $f(x)=\begin{cases} a\dfrac{\sin x}{x-|x|}, & if x<0 \\ e^{-x}+\cos x, & if x\geq 0 \end{cases}$

If f continuous at x=0, then what is the value of a?

A. 4 *B. 2* *C.* $\dfrac{1}{2}$ *D. -4*

5. *Which one of the following is equal to* $\lim_{x\to\infty}\left(\dfrac{x}{x+2}\right)^{-3x}$*?*

A. e^6 *B.* e^{-3} *C.* $e^{-3/2}$ *D.* e^{-6}

6. *If* $a_n=\left(\dfrac{n+3}{n+1}\right)^n$*, then the limit of the sequence* $\{a_n\}_{n=1}^{\infty}$ *is equal to:*

Maths EUEE 2007 E.C
Grade 12
Unit Two

1. Let $f(x)=\begin{cases} a\dfrac{\sin 2x}{x}, if x<0 \\ e^{2x}-2, if x\geq 0 \end{cases}$

If f is continuous at x = 0, then what is the value of a?

A. $\frac{1}{2}$ B. 2 C. $\frac{-1}{2}$ D. -1

2. Which one of the following is equal to $\lim_{x\to\infty}\left(\frac{3x}{3x+2}\right)^{-3x}$?

A. e^2 B. e^{-3} C. e^{-2} D. e^3

Maths EUEE 2008 E.C
Grade 12
Unit Two

1. The left hand side limit, $\lim_{x\to 0^-}\frac{xe^x-|x|}{x}$ is equal to _____.

A. 0 B. 2 C. 1 D. Does not exist

2. Which one of the following is equal to $\lim_{x\to 0}\frac{2x+\tan x}{x\sec x}$?

A. 2 B. 0 C. 1 D. 3

3. In which interval the sequence $\left\{\frac{(-1)^n}{3n}\right\}_{n=1}^{\infty}$ is bounded?

A. $\left[\frac{-1}{9},\frac{1}{12}\right]$ B. $\left[\frac{-1}{3},\frac{1}{6}\right]$ C. $\left[\frac{-1}{6},\frac{1}{3}\right]$ D. $\left[\frac{-1}{12},\frac{1}{9}\right]$

4. Which one of the following is true about the function
$f(x)=\begin{cases}\frac{x^2}{0^x}, x\neq 0\\ , x=0\end{cases}$?

A. f is continuous except at x = 0
B. f has an infinite discontinuity at x = 0
C. f is continuous every where
D. f has x = 0 as a vertical asymptote

5. $\lim_{x\to\infty} x\sin\frac{1}{x}$ is equal to:

A. 0 B. 1 C. ∞ D. -1

Maths EUEE 2004 E.C
Grade 12
Unit Three

1. $\lim_{n\to 0}\frac{x\csc 3x}{x+1}$ is equal to:

A. $\frac{1}{3}$ B. 2 C. 1 D. 0

2. If f(x) = π^2, then f'(1) is equal to

A. 2 B. 2 C.1 D. ∞

3. Let f(x) = $\frac{ax}{x+a}$. For what value of a is f'(1) = 1?

A. $\frac{1}{3}$ B. $\frac{2}{3}$ C. $\frac{3}{2}$ D. 3

4. Which one of the following is necessarily true about a function f(x)?
   A. If f is continuous at x $\neq$ a, then f is differentiable at x = 1.
   B. If f is not differentiable at x = a, then $\lim_{x\to a^-} f(x) \neq \lim_{x\to a^+} f(x)$.
   C. If f is differentiable at x $\neq$ a, then $\lim_{x\to a^-} f(a) \neq \lim_{x\to a^+} f(x)$
   D. If the derivative f'(a) = 0, then f attains its maximum value at = a.

Maths EUEE 2005 E.C

Grade 12

Unit Three

1. If $f(x) = e^{2x} + x - 3\cos(x)$, then what is f'(X)?
   A. $e^{2x} + x - 3\cos(x)$ C. $4e^{2x} - 3\cos(x)$
   B. $e^{2x} + x + 3\cos(x)$ D. $4e^{2x} + 3\cos(x)$
2. If g(X) = xf(x) - $\sqrt{f(x)}$ and f(2) = f'(2) = 4, then which of the following is equal to g'(2)?
   A. 11 B. 8 C. 2 D. 0
3. Which one of the following is true about the derivative of f(x) = x|x|?
   A. f is not differentiable ft x = 0
   B. f'(x) = 2|x|, for every x $\in (-\infty, \infty)$
   C. f'(x) = 2x, for every x $\in (-\infty, \infty)$
   D. f'(x) = |x|+x, for every x $\in (-\infty, \infty)$
4. Which one of the following is the equation of the line tangent to the graph of f(x) = $\frac{1}{x+1} + \cos x$ at (0,f(0))?
   A. x+y = 1 B. x-y = -2 C. x+y=2 D. x+4y = 2

Maths EUEE 2006 E.C

Grade 12

Unit Three

1. *If* $f(x) = \frac{x^2}{1+xg(x)}, g(2) = 1$ *and g'(x)=10, then which one of the following is equal to f'(2)?*
   A. -8 *B.* $\frac{-8}{9}$ *C.* $\frac{4}{3}$ *D.* $\frac{8}{9}$
2. *The simplified form of the derivative of f(x)=* $\frac{1+xinx}{\cos x}$ *is*
   A. Sec x + tan x C. $\frac{1}{1+\tan x}$
   B. $\frac{1+\sin x}{\cos^2 x}$ *D.* $\frac{\cos x}{\sin^2 x}$
3. *If* $f(x)=e^{2x}$ *sinx, then f''(x) is equal to*
   A. $3e^{2x}$ *sin –* $4e^{2x}$*, cos x* *C.* e^{2x}*(3 sin x + 4 cos x)*
   B. $3e^{2x}$ *sin x +* $2e^{2x}$ *cos x* *D.* e^{2x} *(4sinx – 3 sin x)*

4. *If $y=\sin(3x^2)$, then the simplified form of $\frac{d^2y}{dx^2}$ is:*

   A. $-6\sin(3x^2)$ *C. $6\cos(3x^2)-36x^2\sin(3x^2)$*
   B. $\cos(6x)-6\sin(3x^2)$ *D. $x^2\cos(3x^2)+6\sin(3x^2)$*

5. *If $f(x)=x^2\sqrt{2x+12}$, what is the slope of the tangent line to the graph of f at x=2?*

   A. -4 *B. 2* *C. 18* *D. 17*

6. *If $F(x)=f(2x+2).g(1-x^2)$, with f(2)=-3, f'(2)=4, g(1)=-5, and g'(1)=1, then what is the actual value of F'(0)?*

   A. -40 *B. -20* *C. 0* *D. 19*

Maths EUEE 2007 E.C

Grade 12

Unit Three

1. If $f(x)=\ell n(\sqrt{x^2+1})$, which of the following is equal to f'(x)?

   A. $\frac{x}{\sqrt{x^2+3}}$ B. $\frac{x}{x^2+1}$ C. $\frac{2x}{\sqrt{x^2+1}}$ D. $\frac{2x}{x^2+1}$

2. If $f(x) = 2x\,(x^2+1)^4$, then which of the following is an anti derivative of f(x)?

   A. $\frac{2x}{5}\left(x^2+1\right)^5+c$ C. $\frac{x}{5}\left(x^2+1\right)^5+1$

   B. $\frac{2}{5}\left(x^2+1\right)^5+c$ D. $\frac{1}{5}\left(x^2+1\right)^5-1$

3. The Ozone level (in ppb – parts per billion) on a sunny day in a metropolitan area is given by the formula: $p(t) = 80 + 12t - t^2$, where t is time in hours and t = 0 corresponds to 9 A.M. what is the rate of increase of the ozone level after 3 hours (i.e. at 12 A.M.)?

   A. 6 ppb B. 12 ppb C. 107 ppb D. 113 ppb

4. Suppose that a function f has the property that
   f(x + y) = f(x) f(y) for all value of x and y and that
   f (0) = 2, f'(0) = 1. Then which one of the following represents the formula for the derivative f'(x)?

   A. f'(x) = 2f'(x) + 1 C. f'(x) = f(x) + 2
   B. f'(x) = f(x) + 2f'(x) D. f'(x) = 2f(x) – 1

5. if f(2)=-3, f'(2) = 4, g(1) = -5, g'(1) and
   f(x) = f(2x + 2). g $(1-x^2)$, then what is the value of F' (0)?

   A. 19 B. 0 C. -20 D. -40

6. For what values of a and b is the function

   $$f(x)=\begin{cases}1-3x^2, \text{ for } x\le 1\\ ax+b, \text{ for } x>1\end{cases}$$

   differentiable at x = 1?

   A. a = 6, b = 0 C. a = 0, b = -2
   B. a = -3, b = 1 D. a = -6, b =

Maths EUEE 2008 E.C

Grade 12

Unit Three

1. If $f(x)=2x^5-3x$, then $\lim_{x\to 1}\frac{f(x)-f(1)}{x-1}$ is equal to _____.

   A. 1 B. -1 C. 7 D. ∞

2. If $f(x)=e^{3x}\cos x-\frac{x+\pi}{x^2+2}$, then $f'(0)$ is equal to _____.

   A. $3-\frac{\pi}{2}$ B. $\frac{3}{2}$ C. $\frac{7}{4}$ D. $\frac{5}{2}$

3. If $f(x)=\text{In}\left(\sqrt{x^2-5}\right)$, which one of the following is equal to $f'(x)$?

   A. $\frac{x}{x^2-5}$ B. $\frac{-x}{\sqrt{x^2-5}}$ C. $\frac{2x}{\sqrt{x^2-5}}$ D. $\frac{-x}{x^2-5}$

4. $\frac{d}{dx}\left(Ine^{2x}\right)$ is equal to:

   A. $\frac{1}{e^{2x}}$ B. $\frac{2}{e^{2x}}$ C. 2x D. 2

5. If $f(x)=2+|x-3|$ for all x, then the value of the derivative $f'(x)$ at x= 3 is _____.

   A. -1 B. does not exist C. 1 D. 2

Maths EUEE 2004 E.C

Grade 12

Unit Four

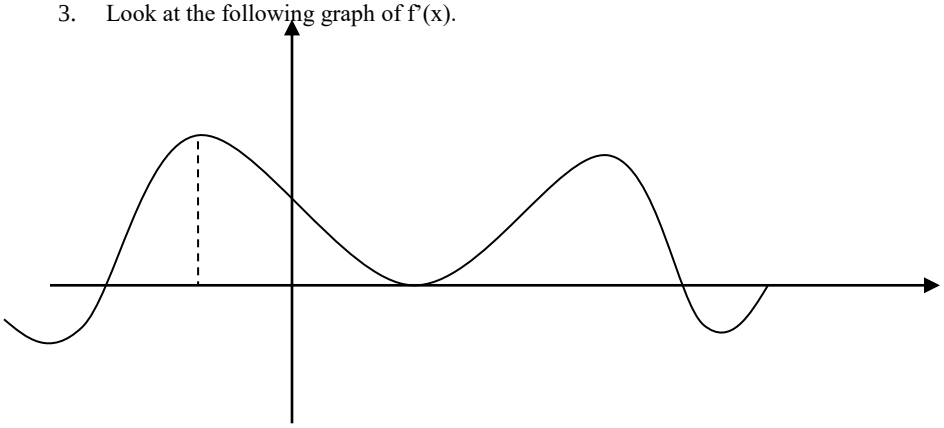
1. If f(x) = xe^{3x}-cos(2x), then f'(0) is equal to

   A. 0 B. 2 C. 6 D. 10

2. At what value (s) of x does f(x) = $\frac{1}{3}x3-\frac{1}{2}x^2-2x+1$ have a local maximum?

   A. x=2 B. x=-1 C. x=5 D. x=2,x=-1

3. Look at the following graph of f'(x).



   Which of the following is true about f?

   A. F is increasing on [c,d]
   B. F if decreasing of [b,c]
   C. F has a local minimum at d.
   D. F has a local extreme value at c.

4. A rectangular field of length 1 and width w meters f w<1 has perimeter 400 meters. If a circular region of area w^2 is to be reserved for office purpose, what should be the length of the field so that the area of the remaining region is maximum?

   A. 50 meters C. 120 meters
   B. 100 meters D. 150 meters

5. On which of the following intervals is the graph of f(x) = $2n(x^2+1)$ concave upward?

A. $(-\infty,-1]\cup[1,\infty)$ C. $(-\infty,0]$

B. $[0,\infty)$ D. [-1,1]

6. Water is poured into a cylindrical tanker of radius 5 meters at a rate of 10 meter cube/min. what is the rate of change of the height of the level of water when it rises to 3 meters?

A. $\frac{2}{25\pi}m/\min$ C. $\frac{1}{2\pi}m/\min$

B. $\frac{2}{5\pi}m/\min$ D. $\frac{3}{5\pi}m/\min$

Maths EUEE 2005 E.C

Grade 12

Unit Four

1. On which one of the following intervals does f(x) = x^4+4x increase?

A. $(-\infty,-1]$ B. $(-\infty,0]$ C. $[-1,\infty)$ D. $(-\infty,\infty)$

2. At which value(s) of x does f(x) = $\frac{1}{4}x^4-2x^2$ have a local maximum?

A. X = 4 C. x = -2 and x = 2

B. x = 0 D. x = 0 and x = 2

3. The volume V of a melting ice cube after t seconds is V = 2000 – 40t + $0.2t^2$ (in cm^3). How fast is the volume changing when t = 40 seconds?

A. $24cm^3$/sec C. $-15cm^3$/sec

B. $15cm^3$/sec D. $-24cm^3$/sec

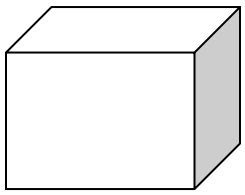
4. A box seen below is to have a square base, and open top and volume of 32 cubic unit. If x is the length of each side of its base and y is its height, how many units should x and y be in order to make the box with the smallest amount of material?

A. x = 4 , y = 2

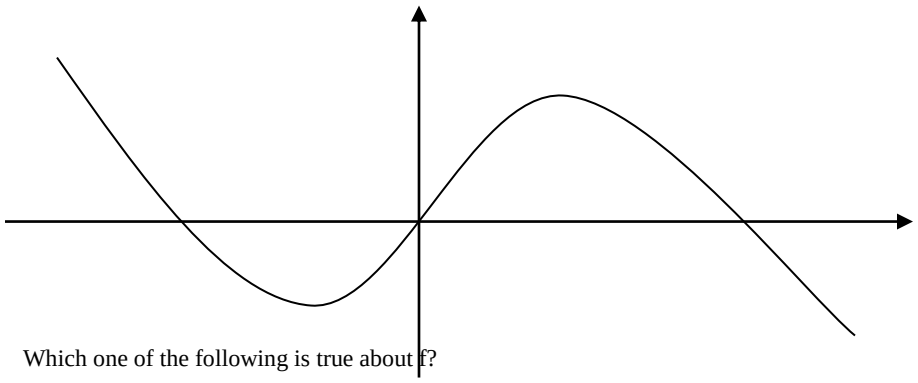
B. x = 2, y = 8

C. x= $\sqrt{8}$, y = 4

D. x = $\sqrt{2}$, y = 16



5. Suppose f is differentiable on $(-\infty,\infty)$ and the graph of its derivative is as shown blow.



Which one of the following is true about f?

A. f is decreasing on $(-\infty,-1]\cup[1,\infty)$

B. f has a local minimum at x = -2

C. f is concave down on $[0,\infty)$

D. f is concave up on (-1,1)

Maths EUEE 2006 E.C

Grade 12

Unit Four

1. *The total cost (in Birr) of producing x iron sheets per day is c(x)=1,000 + 100x – 0.5x2, 0≤ x ≤ 100. What is the marginal (rate of change of) cost at a production level of 80 iron sheets?*

   A. 8.5 *B. 20* *C. 1,800* *D. 5,800*

2. *A water tank is a circular cylinder with base radius 2m and height 3m. if the tank is empty and water is pumped into it a rate of $2m^3$/min, how long does it take for the tank to be full?*

   A. 1.5 min *B.* $\frac{3}{2}\pi$ *min* *C.* 6π *min* *D. 12 min*

3. *Which one of the following is the set of all critical numbers of* $f(x)=\frac{1}{3}x^3-|4x-1|$ *?*

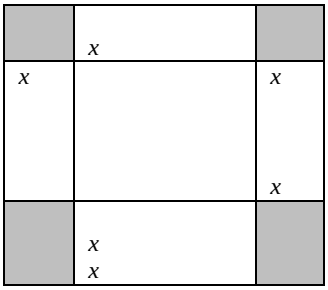
   A. $\left\{\frac{1}{4},2\right\}$

   B. $\left\{-2,\frac{1}{4},2\right\}$

   $\left\{\frac{1}{4}\right\}$

   C. {-2,2}

   D.



4. *If a box with square base and open top is made from 1,200 cm^2 material, what is the largest volume of the box in cm^3?*

   A. 4,000 *B. 8,000* *C. 15,000* *D. 3,000*

5. *Suppose that equal squares are cut from each of the four corners of a square cardboard whose sides are 72 centimeters long.* ***[See the figure below.]*** *The resulting flaps are then folded up to form a box without a top. How long should be each of the four squares that has to be cut off to maximize the volume of the box?*

   A.6CM
   A. 12CM
   B. 15CM
   C. 24CM

Maths EUEE 2007 E.C

Grade 12

Unit Four

1. An object is moving along the parabola $y=\sqrt{2x}$ in xy-plane. At what point on its path does the object becomes closest to the point (2, 0)?

   A. $\left(3,\sqrt{6}\right)$ B. (1,1) C. $\left(3,\sqrt{2}\right)$ D. (2,2)

2. What is the absolute maximum value of $f(x)=2x^2 - x^4 - 4$ on [0,2]?

   A. -3 B. 3 C. -4 D. 12

3. A leader 6 m long rests against a vertical wall. If the bottom of the ladder slides away from the wall at a rat (speed) of ½ m/sec, how fast is the angle between the top of the ladder and the wall changing when the angle is $\frac{\pi}{4}$ rad?

   A. $\frac{\sqrt{2}}{12}$ rad/sec B. $\frac{\sqrt{2}}{2}$ rad/sec C. $\frac{\sqrt{2}}{6}$ rad/sec D. $\frac{\sqrt{2}}{3}$ rad/sec

4. Which one of the following is necessarily true?

   A. If f'(x) = 0 for all x in an interval I, then f(x) = 0 for all x in I.
   B. If $f(x) = x^2 \sin x + 5$, then there is $c \in (0, \pi)$ such f'(c)=0.
   C. If $f(x) = ex + x^2$ is increasing on $(-\infty, \infty)$.
   D. If f'(c) = 0, then *f* attains its maximum or minimum value at x = c.

5. Let $f(x)=\begin{cases}3-e^{2x}, if x<0.5\\ \dfrac{2^x-5}{x+1}, if x\geq 0.5\end{cases}$. If c is a zero of f, that is,

f(c)=0, then which one of the following intervals must contain c?

A. $(-\infty,0]$ B. [0,1] C. [1,2] D. [2,3]

6. A company manufactures x computer sets per month. The monthly marginal profit (in Birr) is given by:

P'(x) = 165 – 0.1x, for 0 ≤ x ≤ 400.

The company is currently manufacturing 10 sets of computers per month, but is planning to increase production. What is the total change in the monthly profit if the monthly production increased to 60 sets?

A. Birr 500. B. Birr 1,865. C. Birr 8,075. D. Birr 18,635

7. The total cost (in Birr) of producing x radio sets per day is given by the expression ¼ x^2 + 35x + 25 and the price set at which they may be sold is given by 50 – ½ x. what should be the daily output to obtain a maximum total profit?

A. 50 sets per day C. 10 sets per day

B. 23 sets per day D. 7 sets per day

8. The number of shoes s that a factory can produce per day is a function of the number of hours t it operates:

s(t) = 40t for 0 ≤ t ≤ 12.

The daily cost c, in Birr, to manufacture s shoes is given by the function

$c(s) = 0.1s^2 + 90s + 800$.

If the factory operates for 10 hours, what is the cost it incurs in production as much shoes it can within this time?

A. Birr 400 B. Birr 1,600 C. Birr 52,800 D. Birr 124,600

Maths EUEE 2008 E.C

Grade 12

Unit Four

1. Let f be twice differentiable function on $\mathbb{R}$. Which one of the following is necessarily true?

A. If $f'(c)=0$, at some $C\in\mathbb{R}$, then f has a relative extreme value at x = c.

B. If $f'(x)$ is increasing, the n the graph of y = $f(x)=0$ $x\in\mathbb{R}$.

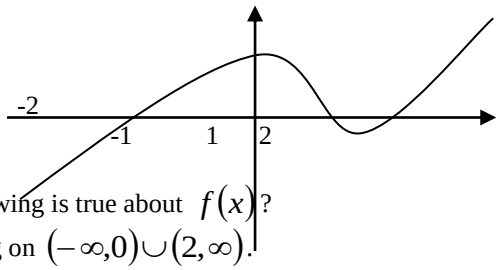
C. If $f'(x)=0$ for all $x\in\mathbb{R}$ then $f(x)=0$ for all $x\in\mathbb{R}$.

D. If $f(x)$ is increasing, then $f''(x)\geq 0$ for $x\in\mathbb{R}$.

2. Suppose is differentiable on $(-\infty,\infty)$ and the graph of its derivative, $y=f'(x)$ is as shown in the following figure.

y

$y=f'(x)$



Which one of the following is true about $f(x)$?

A. $f(x)$ is increasing on $(-\infty,0)\cup(2,\infty)$.

B. $f(x)$ has a local extreme value at x = 2.

C. $f(x)$ has a local minimum value at x = -2.

D. $f(x)$ has a local maximum value at x = 0.

3. A closed cylindrical can is to be made to hold 1000 cm3 of oil. What are the dimensions (radius r and height h) that will minimize the total surface area of the can?

A. $r=\dfrac{\sqrt[3]{50}}{\pi}$, $h=2\dfrac{\sqrt[3]{50}}{\pi}$ C. $r=\dfrac{\sqrt[3]{50}}{\pi}$, $h=2\sqrt[3]{\dfrac{50}{\pi}}$

B. $r=\dfrac{\sqrt[3]{500}}{\pi}$, $h=2\dfrac{\sqrt[3]{500}}{\pi}$ D. $r=\dfrac{\sqrt[3]{500}}{\pi}$, $h=2\sqrt[3]{\dfrac{500}{\pi}}$

4. The graph of y = 5x4 – x5 has a point of inflection at:

A. (3, 162) only
B. (4, 256) only
C. (0, 0) only
D. (0, 0) and (3, 162)

5. Which one of the following is true about the function f defined by $f(x) = x^2 + e^{2x}$?
   A. f is decreasing for $x \geq 0$
   B. f is increasing for $x \geq 0$
   C. f has a relative minimum at $x = 0$
   D. f has a relative maximum at $x = 0$

Maths EUEE 2004 E.C

Grade 12

Unit Five

1. Which of the following is an ant derivative of f(x) = tan x?
   A. $\frac{1}{2}\tan^2 x$
   B. $\sec^2 x$
   C. in(cos x)
   D. in (sec x)

2. Which of the following is equal to $\int \frac{x}{x^2+2x+1}dx$?
   A. $\ln(x^2+2x+1)+c$
   B. $\ln|x+1| - \frac{1}{x+1} - c$
   C. $\ln(x^2+2x+1)\ \frac{1}{x+1} - c$
   D. $\ln(x^2+2x-1) + \frac{1}{x+1} + c$

3. $\int \frac{e^{2x}-4x}{xe^{2x}}$ dx is equal to
   A. $\ln|x| + 2e^{-2x} + c$
   B. $\ln|x| - 4e^{2x} + c$
   C. $\ln|x| + 4e^{-2x} + c$
   D. $-\frac{1}{x^2} + 2e^{-2x} + c$

4. Which of the following is equal to $\int_0^1 \frac{(x-1)^2}{x+1}dx$?
   A. $-\frac{3}{2} + \ell n16$
   B. $-\frac{5}{2} + \ell n15$
   C. $-\frac{5}{2} + 4\ell n2$
   D. $\frac{5}{2} + \ell n16$

5. If f(x) = $\begin{cases} \sin x, x \leq o \\ 3x\sqrt{x^2+1}, x > 0 \end{cases}$, which of the following is equal to $\int_{\frac{-x}{2}}^{\sqrt{8}} f(x)dx$?
   A. 17
   B. 25
   C. 27
   D. $3\sqrt{8}$

6. The volume of the solid which is generated when the region bounded by y $\sqrt{x+1}$ and the x-axis from x = 0 to x = 2 is rotated about the x – axis is equal to
   A. 4π
   B. 3π
   C. $\frac{4}{3}\pi$
   D. $\frac{3}{4}\pi$

Maths EUEE 2005 E.C

Grade 12

Unit Five

1. What is an ant derivative of f(x) = $\frac{2}{4x^2+4x+1}$?
   A. $\frac{1}{2x+1}$
   B. $-\frac{1}{2x+1}$
   C. $\frac{-2}{2x+1}$
   D. $\ell n(4x^2+4x+1)$

2. What is the value of $\int_0^{\frac{\pi}{2}} 2x\cos x dx$

A. B. $\frac{\pi}{2}+1$ C. $\pi+2$ D. $\frac{\pi}{2}-1$

3. Which one of the following is equal to $\int \frac{1}{x^2+x}dx$?

A. $\ell n|x^2+x|+c$ C. $\ell n|x|-\ell n|x+1|+c$

B. $2\ell n|x-1|+\ell n|x|+c$ D. $\ell n|x|+\ell n|x+1|+c$

4. Which one of the following is equal to $\int (1+x)3^x dx$?

A. $(1+x)3^x - 3^x + c$ C. $(1+x)3^x + \log_3 e - (\log_3 e)^2\, 3^x + c$

B. $(1+x)3^x + (\log_3 e)\, 3^x + c$ D. $(1+x)3^x + \log_3 e - 3^x(\log_3 e) + c$

5. What is the area of the region between the graphs of y = x2 and y = -x + 2, where $0 \le x \le 2$?

A. 3 B. 2 C. $\frac{3}{2}$ D. $\frac{2}{3}$

6. Which one of the following is equal to $\int \frac{\ell n(xe^x)}{x}dx$?

A. $\ell n|x|+\frac{1}{2}e^x+c$ B. $\frac{1}{2}(\ell nx)^2+x+c$ C. $\ell n|x|+e^x+c$ D. $\frac{1}{x^2}(\ell nx)^2+c$

Maths EUEE 2006 E.C

Grade 12

<u>Unit Five</u>

1. *If F(x) is an antiderivative of f(x)=* $1-\frac{2}{x^2}$ *and F(1)=0, then* $F'(2)$ *is equal to:*

A. 0 *B.* $\frac{1}{2}$ *C.* $\frac{-1}{2}$ *D. 3*

2. *Which one of the following is equal to* $\int_0^{\pi/2} \frac{x-\sin x}{\sec x}dx$ *?*

A. $\frac{\pi-3}{2}$ *B.* $\frac{\pi-1}{2}$ *C.* $\frac{3-\pi}{2}$ *D.* $\frac{\pi+3}{2}$

3. *What is the area of the region between the graphs of* $y=-x^2+2$ *and* $y=|x|$*, where* $-1 \le x \le x$*?*

A. $\frac{11}{6}$ *B.* $\frac{25}{6}$ *C.* $\frac{7}{6}$ *D.* $\frac{11}{3}$

4. *What is the derivative of f(x)=* $\int_0^{(x^2+\pi} \frac{dt}{\sin t+1}$ *?*

A. $\frac{\cos x}{\sin(x^2+\pi)+1}$ *C.* $\frac{2x\cos x}{\sin(x^2+\pi)+1}$

B. $\frac{2x}{\sin(x^2+\pi)+1}$ *D.* $\int_0^{2x} \frac{dt}{\sin t+1}$

5. *If* Q_i *,* D_i *and* P_i *are respectively the* i^{th} *– quartile, decile and percentile of a data arranged in an increasing order, then which one of the following is necessarily true?*

A. $Q_2=\frac{Q_1+Q_2}{2}$ *B.* $D_3 > P_{25}$ *C.* $P_{25} > Q_1$ *D.* Q_2 *= mean of the data*

6. *Which one of the following is equal to* $\int \frac{x+\ell n(x+1)}{(x+1)^2}dx$ *?*

A. $\ell n(x+1)+\frac{x}{x+1}+c$ *C.* $(x+1)^2-\frac{1}{x+1}+c$

B. $(x+1)^2+\frac{1}{x+1}+c$ *D.* $\frac{x\ell n(x+1)}{x+1}+c$

7. *What is the area of the region between the graph of f(x) =-x^2+4x-3 and the x-axis from x=0 to x=3?*

A. $-\frac{2}{3}$ *B.* $\frac{2}{3}$ *C.* $\frac{4}{3}$ *D.* $\frac{8}{3}$

Maths EUEE 2007 E.C

Grade 12

Unit Five

1. What is the area of the region between the graphs of y = sin x and x – axis where $0 \le x \le 2\pi$?

A. 4 B. 4π C. 2 D. 2π

2. Which one of the following is equal to $\int \frac{\ell nx+x^2e^x}{x}dx$?

A. $\frac{1}{2}\ell n^2x+e^x(x^2-1)+c$ C. $\frac{1}{x^2}\ell nx+e^x(x-1)+c$

B. $\frac{1}{2}\ell n^2x+e^x(x\ \ -1)+c$ D. $\frac{-1}{x^2}\ell nx+e^x(x-1)+c$

3. The derivative of the function F(x) = $\int_{-x}^{x}\frac{1}{1+t}$ dt is:

A. $\frac{2}{1-x^2}$ B. In |1 + x| C. $\frac{1}{1+x}$ D. $In\left|\frac{1+x}{1-x}\right|$

Maths EUEE 2008 E.C

Grade 12

Unit Five

1. If $f(x)=3x^2\sqrt{x^3-1}$, then which of the following is an anti-derivative of f(x)?

A. $\frac{3x}{2}(x^3-1)^{3/2}+c$ C. $\frac{3}{2}(x^3-1)^{3/2}$

B. $\frac{2}{3}(x^3-1)^{3/2}$ D. $\frac{3}{2}(x^3-1)^{2/3}+c$

2. Which of the following is equal to $\int \frac{(Inx)^2+x^2\cos x}{x}dx$?

A. $\frac{1}{x^2}Inx+x\sin x-\cos x+c$ C. $\frac{1}{3}(Inx)^3+x\sin x+\cos x+c$

B. $\frac{1}{3}(Inx)^3+x\sin x-\cos x+c$ D. $\frac{1}{x^2}Inx+x\sin x+\cos x+c$

3. The volume of the solid generated when the region bounded between the graph of $y=\begin{cases}x^2, 0\le x\le 2\\ 4,\ 2\le x\le 3\end{cases}$ and x-axis is rotated about the x-axis is:

A. $\frac{32\pi}{5}$ B. $\frac{112\pi}{5}$ C. $\frac{112\pi}{3}$ D. $\frac{64\pi}{5}$

4. The value of $\int_0^3 (x+1)e^{(x^2+2x)}dx$ is:

A. $\frac{e^3}{2}$ B. $\frac{e^4-e}{2}$ C. $\frac{e^3-1}{2}$ D. e^3-1

5. $\int_0^3 (x+1)^{\frac{1}{2}}dx =$ _____.

A. $\frac{21}{2}$ B. $\frac{14}{3}$ C. 7 D. $\frac{16}{3}$

6. Given $f(x)=\begin{cases}x+1, for x<0\\ \cos\pi x, for x\ge 0\end{cases}$, then $\int_{-1}^{1} f(x)dx =$ _____.

A. $\frac{1}{2}+\frac{1}{\pi}$ B. $\frac{1}{2}-\frac{1}{\pi}$ C. $\frac{1}{2}$ D. $-\frac{1}{2}$

Maths EUEE 2004 E.C

Grade 12

Unit Six

1. If a sphere with center C (0,1,1) interests the z-axis at P(0,0,3), then the radius of the sphere is equal to

A. 5 B. 3 C. $\sqrt{3}$ D. $\sqrt{5}$

2. Suppose A and B are the end points of a diameter of the sphere whose equation is $x^2 + y^2 + (z+2)^2 = 1$. If A = (1,0,-2), then B is equal to

A. (0,1,-2) C. (-41,0,-2)
B. (0,0,-1) D. (0,-1,-2)

3. Let $_1$ and $_2$ be two lines in space intersecting at the origin, (0, 0, 0). If $_1$ and $_2$ pass through point A(1,1,0) and V(0,1,1) respectively, there the angle between $_1$ and $_2$ is equal to

A. 30° B. 45° C. 60° D. 90°

4. Let $\bar{a}=-\bar{i}+3\bar{k} and \bar{b}=-\bar{i}+j$ be vectors in the space. Which one of the following is the cosine of the angle between $\bar{a}$ and $\bar{a}-\bar{b}$?

A. $\frac{9}{10}$ C. $\frac{3}{\sqrt{10}}$
B. $\frac{3}{3}$ D. $-\frac{9}{10}$

5. Let $\bar{V}=3i-4k$, when $\bar{i}$ and $\bar{k}$ are the standard unit vectors in the direction of positive x-axis and positive z-axis, respectively, and $\overline{AB}$ be a vector from the point A(0,1,2) to a point B in space iv $\overline{AB}$ is parallel to $\bar{V} and \left\|\overline{AB}\right\|$ = 10, then point B is at

A. (-6,-1,10) C. (6,1,-6)
B. (6,-1,-10) D. (-6,-1,6)

6. Consider the following statement:

$\frac{x^2+2}{x} \neq 0$ for every real number x

To show this, a person constructed the following proof.

"Proof: Take x = 1 Then, $\frac{x^2+2}{x} = \frac{1^2+2}{1} = 3 \neq 0$

In the same way, if we take x = n for any real number n we get

$\frac{x^2+2}{x} = \frac{n^2+2}{n} \neq 0$

It follows that $\frac{x^2+2}{x} \neq 0$, for every number x,"

Which one of the following is true about this proof?

A. The proof is correct by the principle of induction
B. The proof is correct by the method of exhaustion
C. The proof is correct and it uses the method of direct proof
D. It is not a valid proof since its argument cannot lead to the conclusion

Maths EUEE 2005 E.C

Grade 12

Unit Six

1. Suppose $\vec{A} = 2\vec{j} - \vec{k}$ and $\vec{B} = 5\vec{i} + 15\vec{k}$, where $\vec{i}$, $\vec{j}$ and $\vec{k}$ are the standard unit vectors in the directions of positive s, y and z – axis, respectively. Which one of the following is unit vector in the direction of $\vec{A} + \frac{1}{5}\vec{B}$?

A. $\frac{3}{5}\vec{i} + \frac{4}{5}\vec{k}$
B. $\frac{1}{3}\vec{i} + \frac{2}{3}\vec{k} + \frac{2}{3}\vec{k}$
C. $\frac{4}{5}\vec{i} - \frac{3}{5}\vec{k}$
D. $\frac{2}{3}\vec{i} - \frac{2}{3}\vec{k} + \frac{2}{3}\vec{k}$

2. Suppose p (1,2,1) and Q(1,0,2) are points in space and $\vec{A} = \overline{PQ}$. If $\vec{B}$ is parallel to $\overline{PQ}$ and $\vec{A}.\vec{B}$ = -10, then which one of the following is true?

A. $\vec{A}$ and $\vec{B}$ has the same direction
B. $\left\|\vec{B}\right\| = 10\left\|\vec{A}\right\|$
C. $\left\|\vec{B}\right\| = \frac{1}{10}\left\|\vec{A}\right\|$
D. $\left\|\vec{B}\right\| = 2\left\|\vec{A}\right\|$

3. Which one of the following points is closer to the sphere $x^2+y^2+z^2-2x+6z+9=0$?

A. (1,0,0) B. (0,0,0) C. (0,-1,0) D. (0,0,-1)

4. Let $\vec{a} = 2\vec{i} + (x-1)\vec{j} + \vec{k} and \vec{c} - \vec{i} + \vec{j} + y\vec{k}$ be vectors. If $\vec{a}.\vec{c} = 0$ and $\left\|\vec{a}\right\|$ = 3, which one of the following is a possible value of y?

A. -4 B. -1 C. 3 D. 4

Maths EUEE 2006 E.C

Grade 12

Unit Six

1. Which one of the following is equivalent to $\neg[(\forall x)(p(x) \Rightarrow Q(x))]$*?*

A. $(\forall x)(\neg P(x) \Rightarrow \neg Q(x))$
C. $(\exists x)(\neg P(x) \wedge Q(x))$

B. $(\exists x)(\neg P(x) \Rightarrow \neg Q(x))$ *D.* $(\exists x)P(x) \wedge Q(x))$

2. *Suppose P and Q are points in space such that the midpoint of* $\overline{PQ}$ *is on the negative z-axis and the distance between P and Q is 6. If P=(2,-1,0), then what is the coordinate of Q?*

A. (-2,1,4) *B. (2,-1,6)* *C. (2,-1,-6)* *D. (-2,1,-4)*

Maths EUEE 2007 E.C

Grade 12

Unit Six

1. If P= (3, α - 1, α + 2) and Q = (2α + 1, 3, 3α) are points in space, what should be the value (s) of α so that the distance between the two points is 6?
   A. α = -2 or α = 5 C. α = - 1 or α = 3
   B. α = 0 or α = 5 D. α = - 3 or α = 2
2. If (-1, 2, 2) and (1, 0, -2) are endpoints of a diameter of a sphere, then which one of the following is true about the sphere?
   A. (0,1,0) is a point on the sphere
   B. The equation of the sphere is $x^2 + (y-1)^2 + z^2 = 6$
   C. The equation of the sphere is $x^2 + (y-2)^2 + z^2 = 6$
   D. The radius of the sphere is 6.
3. Suppose ℓ is the line through the center of the sphere $x^2 + y^2 = (z-2)^2 = 9$ and the intersects sphere at (1,2,4). What is the cosine of the angle between ℓ and positive z – axis?
   A. $\frac{2}{3}$ B. $\frac{1}{3}$ C. $\frac{3}{5}$ D. $\frac{4}{5}$
4. Suppose that the equation $x^2 + y^2 + z^2 + 2x + 8z = 6(y + 1)$. Represents a sphere. Where is the point (1, -1, 4) located relative to the sphere?
   A. Inside the sphere,
   B. On the sphere
   C. At the center of the sphere
   D. Outside the sphere

Maths EUEE 2008 E.C

Grade 12

Unit Six

1. Let the angle between $\vec{V} = -2\vec{i} - \vec{j} + 2\vec{k}$ and $\overrightarrow{PQ}$ be 600, where P and Q are points in space. If $\vec{V} \bullet \overrightarrow{PQ} = 2$, then what is that distance between P and Q?
   A. $\frac{3}{4}$ B. $\frac{4}{5}$ C. $\frac{4}{3}$ D. $\frac{5}{4}$
2. If one of the end point of the line segment is (3, 2, -4) and the mid-point is (4, 1, -2), then the coordinate of the other end point is:
   A. (5, 0, 0) B. (2, 0, 5) C. (5, 1, 2) D. (3, 1, 0)

Maths EUEE 2004 E.C

Grade 12

Unit Seven

1. Let an = n2 – n, when $n \in N$ (set of natural numbers). Which one of the following is true, when k is an arbitrarily chosen natural number and m is an integers?
   A. a_n is not a multiple of 2 for some $n \in N$ because $a_1 = 0$.
   B. a_n is a multiple of 2 for all $n \in N$ because $a_1 = 0$ and if $a_k = 2m$, then $a_k+1 = 2(m+1)$

C. a_n is a multiple of 2 for all $n \in N$ because $a_1 = 0$ and if $a_k = 2m$, then $a_k+1 = 2(m+k)$

D. a_n is a multiple of 3 for all $n \in N$ because $a_1 = 0$ and if $a_k = 3m$, then $a_k+1 = 3(m+k)$

Maths EUEE 2005 E.C

Grade 12

Unit Seven

1. *Which one of the following describes the principle of Mathematical induction on a set of natural numbers?*
   - *A. If an assertion is true for a natural number n, then it is true for n+1*
   - *B. If an assertion is true for 1 and it is true for n +1, then it is true for some n.*
   - *C. If an assertion holds for n = 20 and for any $n \geq 20$, then it is true for n implies true for n + 1*
   - *D. If an assertion is true for n = 1, and is true for n = k, whenever is true for n = k + 1.*

Maths EUEE 2006 E.C

Grade 12

Unit Seven

1. *The following is an assertion of a person and his proof.*
   "For any natural numbers n, $n! < 10^n$.
   Proof:
   Step 1. Let N = 1. Since 1! = 1 and $10^1 = 10$, it is true that $1! < 10^1$.
   Step 2. Let N = 2. Since 2! = 2 and $10^2 = 100$, it is true that $2! < 10^2$.
   Step 3. Let N = 3. Since 3! = 6 and $10^3 = 1000$, it is true that $2! < 10^3$.
   Step 4. Continuing in this manner, we can see that whenever
   $K! < 10^k$ is true, then $(K + 1)! < 10^{k+1}$ is also true.
   Therefore, by induction, $n! < 10^n$ for all natural numbers."
   Which one of the following is true about the proof?
   - *A. The proof is correct by the principle of mathematical induction, though step 2 and step 3 can be omitted.*
   - *B. The proof is correct by the principle of mathematical induction, and step 2 and step 3 are necessary since they provide additional information.*
   - *C. The proof is invalid because step 4 did not justify the desired induction step.*
   - *D. The proof follows the technique of a proof by exhaustion.*

Maths EUEE 2007 E.C

Grade 12

Unit Seven

1. If each of the compound propositions $P \vee Q$, $P \Rightarrow R$ and $\neg R$ is True, then which one of the following is True?

   A. P B. Q C. $Q \Rightarrow P$ D. $P \wedge \neg R$

2. Consider the formula for a natural number $n \in N$:

   $2 + 4 + 8 - \ldots + 2n = 2^{n+1} + 1$

   To proof this formula a person has used the following argument. *"Assume the formula is true for n = k, for some $k \in N$. Then the person has shown that the formula is also true for n = k + 1. And then, the person has concluded that, by*

the principle of mathematical induction, the formula is true for all natural numbers $n \in N$." Which one of the following statements is true about the above arguments?

A. The formula holds true though it does not work for n = 1.
B. Since the left – hand – side is an even number and the right – hand – side an odd number, the principle of Mathematical induction if False.
C. This is one example where the principle of Mathematical induction fails to work.
D. The above formula does not work for all natural numbers $n \in N$

Maths EUEE 2007 E.C

Grade 12

Unit Seven

1. What is the contra positive of "If $x \in \mathbb{N}$, then x is integer and $x > 0$"?
   A. If x is not integer or $x < 0$, then $x \notin \mathbb{N}$.
   B. If x is integer and $x > 0$, then $x \in \mathbb{N}$
   C. If x is not integer or $x \leq 0$, then $x \notin \mathbb{N}$
   D. If $x \notin \mathbb{N}$, then x is not integer and $x \leq 0$

2. Consider the following assertion of a person and his proof. "If x and y are equal positive integers, then $x + y = y$."
   Proof: the following steps and reasons are used to proof the assertion.

Step		Reason
1.	$x = y$	Given hypothesis
2.	$x^2 = xy$	Multiply both sides of (1) by x
3.	$x^2 - y^2 = xy - y^2$	Subtract y^2 from both sides of (2)
4.	$(x-y)(x+y) = (x-y)y$	Factor both sides of (3)
5.	$x + y = y$	Divide both sides of (4) by x-y

   Step 5 completes the proof
   A. It is a correct direct proof of the assertion.
   B. It follows the technique of a proof by contradiction because the steps lead to a contradiction.
   C. The proof is invalid because Step 4 does not lead to Step 5.
   D. The proof is invalid because Step 4 does not follow from step 3.

3. Which one of the following is a valid assertion that can be proved y the principle of mathematical induction?
   A. $2^n > 10n$ for every integer n such that $n \geq 6$.
   B. $r^2 > 0$ for every real number r such that $r \geq 1$
   C. $n^2 > 10n > 2n^2$ for every natural number $n \geq 1$
   D. $2^n > 8n$ For every integer n such that $n \geq 3$

4. The valid conclusion from the premises:
   P V Q, $Q \Rightarrow R, P \Rightarrow M, \neg M$ is _____.
   A. $P \wedge (R \vee R)$ B. $P \wedge (P \wedge R)$ C. $Q \wedge (P \wedge R)$ D. $R \wedge (P \vee Q)$