Mathematics Practice Questions Prepared For Grade 12 Students For Summer Tutorial at Arsi University



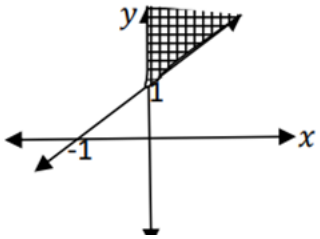
The Practice Questions Contains Entrance Exam of different years Based on Grade 11 unit 1-8.

By
Biratu Abera

Arsi University
August/2024

UNIT 1
REVISION ON RELATIONS AND FUNCTIONS

1) Which one of the following statement is wrong?
   A. A set of points in a coordinate plane represents a function if and only if no two points in a given set are on the same vertical line.
   B. There are functions whose inverses are not function.
   C. The range of signum function is $\{-1, 0, 1\}$.
   D. Function is a relation in which no two distinct ordered pairs have the same first element.
   E. None of the above
2) Which one of the following is not true
   A. A set whose elements are ordered pairs is called relation.
   B. If A and B are non-empty sets, then $A \times B$ is a relation from B to A.
   C. All functions are relation, but all relations are not functions.
   D. A relation may consists of finite or infinite set of ordered pairs
3) If A = {1, 2, 3} and B = {3, 4, 5, 6}, which one of the following relations is not from A to B?
   a. R={(1,4),(2,5),(6,3)} C. R = {(2, 5), (3, 6)}
   b. R = {(1, 6), (1, 4), (3, 3)} D. R = {(1, 5), (1, 6), (2, 4), (2, 6), (3, 4), (3, 5)}
4) If A={0,1,2,3,4,5} : B={0,1,2,3,4} and R is a relation from A to B such that $R = \{(x, y): y = \sqrt{x-1}\}$, then what is the range of R
   A. {1, 2, 5} B. {0, 1, $\sqrt{2}$, $\sqrt{3}$, 2} C. {0, 1, 2} D. {0, 1, 2, 3}
5) Which one of the following relations is represented by the shaded region shown on the figure below?



   A. $R = \{(x, y) | x, y \in \mathbb{R}, y \leq x - 1 \text{ and } x \leq 0\}$
   B. $R = \{(x, y) | x, y \in \mathbb{R}, y \geq x + 1 \text{ and } x > 0\}$
   C. $R = \{(x, y) | x, y \in \mathbb{R}, y \leq x + 1 \text{ and } x \leq 0\}$
   D. $R = \{(x, y) | x, y \in \mathbb{R}, y \geq x + 1 \text{ and } x \geq 0\}$
6) Let R =$\{(x, y): y \geq x^2 + 1 \text{ and } y \leq 5\}$ be a relation, then the inverse of R is
   A.$\{(x, y): x \geq y^2 + 1 \text{ and } y \leq 5\}$ B. $\{(x, y): x \geq y^2 + 1 \text{ and } x \leq 5\}$
   C. $\{(x, y): x \geq y^2 - 1 \text{ and } x \leq 5\}$ D. $\{(x, y): x \geq y^2 + 1 \text{ and } x \geq 5\}$
7) Which of the following relation is not function?
   A. $\{(x, y): y = x^2\}$ B. $\{(x, y): x = y^2\}$

C. $\{(x,y): y = \cos x\}$ D. $\{(x,y): y = 3^x + 1\}$

8) Consider given a relation $R = \{(x,y): y \geq x^2 \; and \; y \leq 2x\}$. Then which of the following is TRUE about this relation?
   A. The domain of R is $\{x \in \mathbb{R}: x \leq 2\}$
   B. The range of R is $\{y \in \mathbb{R}: y > 0\}$
   C. The domain of R is $\{x \in \mathbb{R}: 0 \leq x \leq 2\}$
   D. The range of R is $\{y \in \mathbb{R}: 0 < y < 4\}$

9) Which one of the following relation is a function?
   A. $R = \{(x,y) |\; x \; is \; a \; multiple \; of \; y\}$
   B. $R = \{(x,y): x \; is \; a \; son \; of \; y\}$
   C. $R = \left\{(-2,-8), (-8,-2), \left(-2,-\frac{1}{2}\right), \left(2, \sqrt[3]{2}\right), (-1,1)\right\}$
   D. $R = \{(x,y) | \; x^2 + y^2 = 4\}$

10) Let A={1,2,3,4} and B={0,1,2,3,4,5}. If R is a relation from A to B such that R=$\{(x,y): y = \sqrt{x-1}\}$, then the domain of R is
   A. {1, 2,3,4,5} B. {1,2} C. {1,2,5 } D. {0,1,2,3,4,5}

11) Given $f(x) = \lfloor x \rfloor$, then $f(3-\pi)$ is equal to A. -2 B. -3 C. 3 D. -1

12) Which one of the following is the domain of $f(x) = \sqrt{x - |x|}$?
   A. $\mathbb{R}$ B. $[0,\infty)$ C. $(0,\infty)$ D. $\emptyset$

13) What is the domain and range of the function $f(x) = x^{\frac{4}{3}} \; respectively?$
   A. $\mathbb{R} \; and [0,\infty)$ B. $[0,\infty) and (0,\infty)$
   C. $[0,\infty) and [0,\infty)$ D. $(0,\infty) and (0,\infty)$

14) Given $f(x) = x^3 sgnx$, then Range of f is
   A. $\mathbb{R}$ B. $\{-1,0,1\}$ C. $[0,\infty)$ D. $(-\infty, 0]$

15) The range of $f(x) = 2 - sgnx$ is A.$\{-1,0,1\}$ B. $\{1,0,-1\}$ C. $\{1,2,3\}$ D. $\{-1,2,3\}$

16) Given a Signum function $f(x) = x^2 sgnx$, then what is the domain and range of a given function respectively?
   A. $\mathbb{R}$ and $\mathbb{R}$ B. $\mathbb{R}$ and $\{-1,0,1\}$ C. $\mathbb{R}$ and $\{-9,-4,0\}$ D. $\mathbb{R}$ and {9,4,1}

17) If $f(x) = \frac{\sqrt{x+2}}{x+2} \; and \; g(x) = \frac{1}{x} - 2 \; then \; f\big(g(x)\big)$ is equal to
   A. $\sqrt{x}$ +2 B. $\sqrt{x}$ -2 C. $\sqrt{x}$ D. $\frac{\sqrt{x}}{x}$

18) What is the solution set of $\big|1 + 2\lfloor x \rfloor\big| = 5$?
   A. [2, 3) B. [5,6) C. [2, 2.5) D. [3,2)

19) Let $f(x) = \frac{1}{x}$ and $g(x) = 2x + 1$ then $f\big(g(2)\big) =$ ____
   A. 2 B. ½ C. 1/5 D. 5

20) The inverse of the function $f(x) = \frac{2x}{x+3}$ is equal to A.$-\frac{2x}{x-3}$ B.$-\frac{3x}{x-2}$ C. $-\frac{x+3}{2x}$ D. $\frac{x+2}{3x}$

21) If $f(x) = \ln(\frac{x}{x-1} + 2)\ for\ x > 1$, then the inverse of f(x) is

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

22) Which one of the following function are invertible?

A. $f(x) = logx$ C. $f(x) = x^2$

B. $f = \{(1,2),(3,4),(-5,2),(6,4)\}$ D. $f(x) = x^2 + 1$

23) Which of the following function are not inverse of each other?

A. $f(x) = lnx : g(x) = e^x$ C. $f(x) = x^3 : g(x) = \sqrt[3]{x}$

B. $f(x) = x^3 - 8: g(x) = \sqrt[3]{x+8}$ D. $f(x) = \sqrt{x} : g(x) = x^2$

24) The inverse of $f(x) = \ln(x + 2) - 10$ is equal to :

A. $e^{x+2} - 10$ B. $e^{x+10} - 2$ C. $e^{x+10} + 2$ D. $e^{x+2} + 10$

25) If $f(x) = 4x + 1$ and $g(x) = 3x + k$, what is the value of k for which $(fog)(x) = (gof)(x)$?

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

26) Given $f(x) = x^2 - 2x + 1\ and\ g(x) = 2x + 4\ then\ (fogof)(0) =$ ___

A. 25 B. 30 C. 8 D.60

27) If $h(x) = \frac{1}{2}(sgnx + 1)$, then $h(x) + h(-x) =$ _____

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

28) If $\lfloor x \rfloor^2 - 2\lfloor x \rfloor + 1 = 0$, then what is the value of x A. [2,3) B. [1,2) C. 1 D.[3,2)

29) If $sgn(x^2 - 1) = 1$, then what is the value of x?

a. {1} B. $(-\infty, -1)$ C. $(1, \infty)$ D. $(-\infty, -1) \cup (1, \infty)$

30) Which one of the following is true about Signum, absolute value and greatest integer functions?

A. $sgn(x) = |x|$ for all $x \in \mathbb{R}$ B. $|x| = xsgn(x)$ for all $x \in \mathbb{R}$

B. $sgn(x) \leq \lfloor x \rfloor$ for all $x \leq 0$ D. $sgn(x) \leq \lfloor x \rfloor$ for all $x \geq 0$

31) Which one the following is not true

A. The graph of $\mathbb{R}\ and\ \mathbb{R}^{-1}$ is the mirror image of each other about the line y=x

B. If a function $f: A \to B$ is defined by $y = f(x)$, then range of $f = B$

C. $|x| = -x, if\ x < 0.$

D. The floor function $f(x) = \lfloor x \rfloor$ maps $\mathbb{R}$ into Z

32) If $x < 0, then\ f(x) = \frac{x-|x|}{x}$ is equal to

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

33) If $f(x) = \ln(x - 2)\ and\ g(x) = \sqrt{1 - 2x}$ then the domain of fog is

$A. \{x \in \mathbb{R}: x > 1\}$ B. $\left\{x \in \mathbb{R}: x > \frac{1}{2}\right\}$ C. $\{x \in \mathbb{R}: x < 1\}$ D. $\left\{x \in \mathbb{R}: x < -\frac{3}{2}\right\}$

34) If $f(x) = \log x + 1$ and $g(x) = x^3$, then what is the domain of $(fog)(x)$?

A. [-1, ∞) B. (-1, ∞) C. (-2, ∞) D. (2, ∞)

35) If $f(x) = ax + b$ and $f^{-1}(x+1) = \frac{1}{2}x + 2$, for each $x \in \mathbb{R}$, then what must be the value of a and b?

A. $a = \frac{1}{2}, b = -2$ B$a = 2, b = 2$ C. $a = 1, b = 1$ D. $a = 2, b = -3$

36) Let $f(x) = \frac{1}{e^x+1}$ which of the following is equal to $f^{-1}(x)$? :

A. $\ln(1-x) - lnx$ B. $e^{-x} + 1$ C.$\ln(\frac{1}{x+1})$ D. $\frac{1}{e^{-x}+1}$

37) If f is greatest integer functions and g is absolute value function, then what is the value of $(fog)\left(\frac{3}{2}\right) + (gof)(-\frac{4}{3})$?

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

38) Let $f(x) = \sqrt{x^3}$ and $(fog)(x) = \sqrt[4]{x}$, what is the value of $g(64)$?

a. $\sqrt{3}$ B. 2 C. $\sqrt{2}$ D. 4

39) If $f(x) = \frac{x+1}{x-1}$ and $f(a) = 5$ then $f(2a)$=_____ A. 2 B. 4 C. 6 D. 8

40) If $f(x) = x - x^2$ *and* $g(x) = \frac{1}{x}$ *then* $g\left(f\left(\frac{1}{x}\right)\right)$ is equal to

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

41) If $f(x) = 2x + 1$ and $f\big(g(x)\big) = 8x^2 + 10x - 11$, then $g(x) =$ _____

A. $5x^2 + 4x - 6$ C. $4x^2 + 10x - 6$

B. $4x^2 + 5x - 6$ D. $8x^2 + 10x - 11$

42) If the function $sgn(\ln(cosx)) = 0$, then What is the possible value of x.

A. 60° B. 360° C. 0 D. B and C

Unit 2
Rational Expressions And Rational Functions

1) Which of the following is the universal set of the expression $\frac{1}{x^2}+\frac{x+1}{x^2+x}$? (UEE 2013)
   A. $\mathbb{R}\backslash\{0,-1\}$ B. $\mathbb{R}\backslash\{0,1,-1\}$ C. $\mathbb{R}\backslash\{0\}$ D. $\mathbb{R}\backslash\{0,1\}$

2) Which one of the following is domain of $x-\frac{(x^2+1)}{x^4+x}$?
   A. $\mathbb{R}\backslash\{0\}$ B. $\mathbb{R}\backslash\{-1\}$ C. $\mathbb{R}\backslash\{0,1\}$ D. $\mathbb{R}\backslash\{-1,0\}$

3) Which one of the following is the simplified form of $\frac{4x^4-64}{2-x}$ for $x \neq 2$? (UEE 2015)
   A. $4(x-2)(x^2-4)$ B. $-4(x-2)(x^2+4)$
   B. $4(x+2)(x^2+4)$ D. $-4(x+2)(x^2+4)$

4) What is the simplified form of $\frac{a^{-1}b^{-1}}{a^{-3}-b^{-3}}$? (UEE.2011).
   A. $\frac{a^2b^2}{b^2-a^2}$ B. $\frac{a^2b^2}{b^3-a^3}$ C. $\frac{a^3-b^3}{ab}$ D. $\frac{a^3-b^3}{a-b}$

5) Simplified form of $\frac{4-(a-2)^2}{a^4+2a^2+1} \div \frac{1-\frac{1}{a^2+1}}{a}$ is(UEE.2004)
   A. $\frac{4-a}{a}$ B. $\frac{a}{a^2+1}$ C. $-\frac{1}{a^2(a^2+1)}$ D. $\frac{4-a}{a^2+1}$

6) IF $x=2$ and $y=\frac{1}{3}$, then $\frac{\frac{1}{x}-\frac{1}{y}}{1-\frac{y}{x}} \div \frac{1}{\frac{1}{y}-\frac{3y}{x}}$ is equal to A. -1 B. $-\frac{6}{5}$ C. $-\frac{15}{2}$ D. $\frac{6}{5}$

7) For $a \neq \pm b$, $\frac{a+b}{a-b}+\frac{a}{b-a}-\frac{2ab}{a^2-b^2}$ is equal to
   A. $\frac{-b}{a+b}$ B. $\frac{b}{a+b}$ C. $\frac{-b}{a-b}$ D. $\frac{b}{a-b}$

8) Which one of the following expressions is equal to $\frac{x-3}{(x+1)} \div \frac{x+1}{(x-1)}$?(UEE.2015)
   A. $\frac{x^2+2x+1}{x^2-4x+3}$ B. $\frac{x-1}{x-3}$ C. $\frac{x-3}{x-1}$ D. $\frac{x^2-4x+3}{x^2+2x+1}$

9) If $\frac{x^2+14}{(x+2)(x-1)^2}=\frac{A}{x+2}+\frac{B}{x-1}+\frac{C}{(x-1)^2}$, what are the values of A,B,C respectively?(NE.2014)
   A. 1,-1,3 B. 3,-2,6 C. 2,-2,-5 D. 2,-1,5

10) What is the partial fraction decomposition of $\frac{x^2+x+1}{(x+2)(x^2+1)}$?(UEE.2010)
   A. $\frac{3}{5(x+2)}+\frac{2x+1}{5(x^2+1)}$ B. $\frac{5}{3(x+2)}+\frac{2x+1}{3(x^2+1)}$ C. $\frac{2}{5(x+2)}+\frac{3x+1}{5(x^2+1)}$ D. $\frac{2}{3(x+2)}+\frac{2x+1}{3(x^2+1)}$

11) What is the respective values of A ,B and C, so that $\frac{x-1}{x^3-x}=\frac{A}{x}+\frac{Bx+C}{x^2+1}$? (UEE.2011)
   A. -1, 1, 1 B. -1, 1, 2 C. 1,-2, 0 D. 3,1, 2

12) If $f(x)=\frac{x-1}{(x-2)^2(x+1)}$ which of the following is true about f ? (UEE 2011)
   A. It has an oblique asymptote C. The graph doesn't meet its asymptotes
   B. as $x \to -1^+, f(x) \to -\infty$ D. as $x \to -2^+, f(x) \to -\infty$

13) Which one of the following is the solution set of equation $\frac{3}{x+1}-\frac{1}{x-1}=\frac{2}{x}$? (UEE. 2015)

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

14) Which one of the following is the solution set of equation $\frac{1}{x-2}=\frac{3}{x+2}-\frac{6x}{x^2-4}$?(UEE. 2012)

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

15) If$P(x)=4x^3$ and $Q(x)=3x^2-3x$ then what is the solution set of $\frac{P(x)}{4xQ(x)}+\frac{1}{x}=\frac{1}{q(x)}$? (UEE.2004) A. $\{1,4\}$ B. $\{1\}$ C. $\{-4\}$ D. $\{-1,4\}$

16) If$p(x)=3x^2$ and $q(x)=x^2+x$ then what is the solution set of $\frac{P(x)}{3xq(x)}-\frac{1}{x}=\frac{1}{q(x)}$? (UEE.2004) A. $\{-1,2\}$ B. $\{2\}$ C. $\{-3,2\}$ D. $\{-3\}$

17) The solution set of the equation $1-\frac{5}{x^2+4}=\frac{x-1}{x^2-x}-\frac{1}{x}$?

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

18) The solution set of the equation $\frac{x^2}{x+3}+\frac{3x}{x^2+5x+6}=\frac{2x}{x^2-4}$?

A. $\{0,1\}$ B. $\{-1,1\}$ C. $\{-1,0,1\}$ D. $\{-1,0\}$

19) Which one of the following functions has NO vertical asymptote? (UEE. 2005)

A. $f(x)=\ln(x+1)$ B. $f(x)=\frac{x^3+1}{x^3+8}$ C. $f(x)=\frac{x^2-9}{x-3}$ D. $f(x)=\frac{x-1}{x^2-x}$

20) What is the solution set of $\frac{2}{x}-\frac{x-2}{x^2-2x}=1-\frac{2x-2}{3x-2}$? (UEE. 2005)

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

21) What is the solution set of $\frac{2}{x-1}+\frac{4}{x}=\frac{6}{x-2}$? (UEE. 2014)

A. $\left\{\frac{5}{4}\right\}$ C. $\left\{\frac{4}{5}\right\}$ C.$\left\{\frac{11}{4}\right\}$ D. $\left\{\frac{4}{11}\right\}$

22) Consider a rational functions $f(x)=\frac{x^2-1}{x^2+1}$ which one of the following is true about graph of f? (UEE 2014)

A. It is symmetrical about the origin
B. It is symmetrical about y-axis
C. Its x-intercept is 1
D. Its y-intercept is -1

23) If $f(x)=\frac{x+1}{x-1}$ and $f(a)=5$ then f(2a)=_____(UEE.2006) A. 2 B. 4 C. 6 D. 8

24) Which one of the following is NOT true about $g(x)=\frac{x^2-1}{x^2+1}$

A. The range of g is $(-\infty,1)$.
B. The line $y=1$ is horizontal asymptote.
C. As $x\to-\infty$, $g(x)\to1$.
D. g is an even function.

25) Let $(x)=\frac{x^2-4}{x^2+1}$, what is the range of the function?

A. $\mathbb{R}$ B. $(-\infty,-2]$ C. $(-4,1]$ D. $[-4,1)$

26) Which one of the following is true?(UEE.2006)

A. A polynomial can have infinitely many vertical asymptote

B. The graph of 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 no vertical asymptote

27) Let $(x) = x + 1 + \frac{x-1}{x}$. Then which of the following is not true?

A. The line $y = x + 1$ is an oblique asymptote of the graph

B. $-1-\sqrt{2}$ is na x- intercept the graph of f

C. The graph of the function f doesn't have y- intercept

D. $-1+\sqrt{2}$ is an x- intercepts of the graph of f

28) Which one of the following is true about the graph of $f(x) = \frac{x^2-1}{x-x^2}$?(UEE. 2006)

A. $x = 0$ and $x = 1$ are its vertical asymptote

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 $x \to \pm\infty$

29) The value (s) of x where the graph of the function $y = \frac{x^2-1}{x^3}$ crosses its horizontal asymptote is(are) :(UEE.2007).

A. $x = -2$ B. $x = -1$ and $x = 1$ C. $x = 0$ D. $x = \sqrt{2}$ and $x = 1 + \sqrt{2}$

30) If $p(x) = 3x^2$ and $Q(x) = x^2 + x$, then what is the solution set of $\frac{p(x)}{3q(x)} - \frac{1}{x} = \frac{1}{q(x)}$? (UEE.2007).

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

31) What is the solution set of $\frac{1-\frac{1}{x}}{1-\frac{1}{x^2}} = 3x^2 - \frac{x}{1+\frac{1}{x}}$?(UEE.2008).

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

32) What is the solution set of the inequality $\frac{1}{x} + \frac{x}{x+1} > 1$?

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

B. $(-\infty, -1) \cup (0, \infty)$ D. $\Re \setminus \{0, -1\}$

33) Suppose $f(x) = \frac{Q(x)}{x(x^2-1)}$ where $Q(x)$ is quadratic functions, which one of the following is necessarily true about the graph of f(UEE.2008)

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

B. The graph does not intersect with its horizontal asymptote

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

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

34) Which one of the following is true about the horizontal asymptote(s) of the graph of $y = \frac{|x|+2}{x}$? (UEE.2008).

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

35) Which one of the following is true about the graph of $f(x) = \frac{x^3-x}{x^3(x-1)}$?(UEE.2009).

A. The vertical asymptote of the graph are $x = 0$ and $x = 1$
B. The horizontal asymptote of the graph is $y = 1$
C. The graph intersects its horizontal asymptote at the point (-1,0)
D. The graph intersect the vertical line at $x = 1$ at the point (1,2)

36) Which one the following is true about the graph of $\frac{2x^3+2x^2+3x}{x^2+x}$?(UEE.2010)

A. The vertical asymptote of the graph is only $x = 1$ and its oblique asymptote is $y = 2x$
B. The graph has y-intercept at (0,3)
C. The graph has at least one x-intercept
D. The vertical asymptotes of the graph are $x = 0$ and $x = -1$ and it has no oblique asymptote

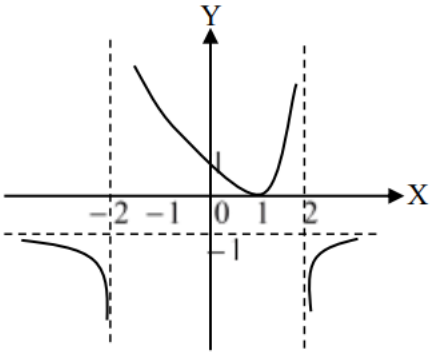
37) Which of the following function best describes the graph given below?

A. $f(x) = \dfrac{x-1}{(x+2)(x-2)}$

B. $f(x) = \dfrac{x^2-1}{(x+2)(x-2)}$

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

D. $f(x) = \dfrac{(1-x)^2}{(x+2)(x-2)}$



38) Which of the following is true about the graph of $f(x) = \frac{x^2+5x+6}{x^2-4} + 3$? (UEE. 2011)

A. The graph has hole at $x = 2$
B. The vertical asymptotes of the graph are $x = 2$ and $x = -2$
C. The horizontal asymptote of the graph is $y = 4$
D. The graph has y-intercept at $(0, -\frac{3}{2})$

39. The value(s) of x where the graph of $Y = \frac{x^2-1}{x^3}$ crosses its horizontal asymptote is (are)...

A. $x = -2$ B. $x = -1$ and $x = 1$ C. $x = 0$ D. $x = -\sqrt{2}$ and $x = 1 + \sqrt{2}$

40. The value(s) of x where the graph of $Y = \frac{x^2-4x+3}{x^3+1}$ crosses its horizontal asymptote is (are)… (UEE.2011).

A. $x = -2$ B. $x = 3$ and $x = 1$ C. $x = 0$ D. $x = \sqrt{2}$ and $x = 1$

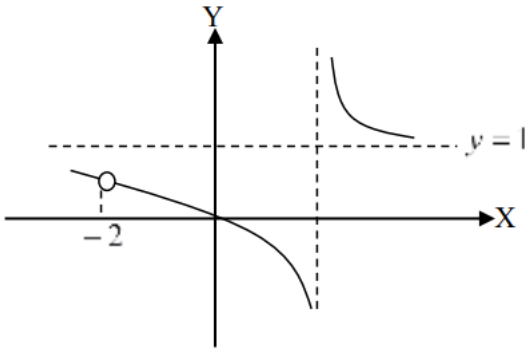
41. The value(s) of x where the graph of $Y = \frac{3x^4+4}{x^3+3x}$ intersects its oblique asymptote is (are)… (UEE.2011).

A. $x = \frac{3}{4}$ B. $x = \pm\frac{4}{3}$ C. $x = \pm\frac{2}{3}$ D. $x = \frac{3}{2}$

42. What is the solution set of $\frac{2-\frac{1}{x}}{4-\frac{1}{x^2}} = 4x^2 - \frac{2x}{2+\frac{1}{x}}$? (UEE.2010).

A. $\left\{1, -\frac{1}{4}\right\}$ B. $\left\{\frac{1}{4}\right\}$ C. $\left\{-1, \frac{1}{4}\right\}$ D. $\left\{-\frac{1}{4}\right\}$

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

44. Zeru can complete certain job in 5 days and Tulu can complete the same job in 3 days. How long it take them to complete the job if they work together.

a. 1.5 B. 600 C. 0. 25 D. 1.875

45. In one morning , if the shadow of building of 20 meters long is 15 meters long , how long is the shadow of a tree of 10 meters long?

a. 5 B. 7.5 C. 7 D. 7.5

46. Legesse bought USD 150 with Birr 7500. At this rate how many USD can he buy with Birr 30000?

a. 600 USD B. 700 USD C. 300 USD D. 800 USD

47. Let the ratio of boys to girls in a certain high school is 4:5. If the total number of students in the school is 1260, what is the number of boys and number of girls in the school respectively?

a. 700 and 560 B. 560 and 600 C. 560 and 700 D. 600 and 560

UNIT 3: MATRICES

1) A rectangular arrangements of numbers in rows and column is called _____
   A. Element B. square matrix C. Matrix D. order
2) The number of rows and number of columns of matrix is called _____
   A. Size of matrix B. Order of matrix C. Dimension of matrix D. all
3) Let a matrix $A = (a_{ij})_{3\times3}$, where $a_{ij} = 100j - 50i$, then what is the value of a_{32}?
   A. 200 B. 50 C. 0 D. 300
4) Let $A = (a_{ij})$ is a 3×3 matrix . If $a_{ij} = 3i - 2j$, then which one of the following is matrix A?
   A. $\begin{bmatrix}2 & 4 & 0\\1 & -1 & 0\\0 & 6 & -2\end{bmatrix}$ B. $\begin{bmatrix}2 & 0 & 5\\3 & 1 & 4\\0 & 6 & -2\end{bmatrix}$ C. $\begin{bmatrix}1 & -1 & -3\\4 & 2 & 0\\7 & 4 & 3\end{bmatrix}$ D. $\begin{bmatrix}2 & 0 & 5\\3 & 1 & 4\\0 & 6 & -2\end{bmatrix}$
5) Let A=$\begin{pmatrix}0 & 1 & 0\\3 & 0 & 2\end{pmatrix}$ and B=$\begin{pmatrix}1 & 1 & 1\\2 & 3 & 2\end{pmatrix}$, then 2A+3B=_____?
   A. $\begin{pmatrix}3 & 5 & 3\\12 & 9 & 10\end{pmatrix}$ B. $\begin{pmatrix}3 & 5 & 0\\9 & 6 & 12\end{pmatrix}$ C. $\begin{pmatrix}0 & 5 & 0\\12 & 9 & 12\end{pmatrix}$ D. $\begin{pmatrix}3 & 5 & 3\\12 & 12 & 12\end{pmatrix}$
6) Given matrices $A = \begin{bmatrix}2 & 0 & 5\\3 & 1 & 4\\0 & 6 & -2\end{bmatrix}$ and $B = \begin{bmatrix}1 & 3 & 0\\6 & 5 & 2\\9 & 7 & 0\end{bmatrix}$. Which of the following is A-B?
   A. $\begin{bmatrix}1 & -3 & 5\\-3 & -4 & 2\\-9 & -1 & -2\end{bmatrix}$ B. $\begin{bmatrix}1 & 3 & 5\\-3 & -4 & 2\\-9 & 1 & 2\end{bmatrix}$ C. $\begin{bmatrix}1 & -3 & -5\\-3 & -4 & 2\\9 & 1 & 2\end{bmatrix}$ D. $\begin{bmatrix}1 & 3 & 5\\-3 & -4 & 2\\9 & 1 & 2\end{bmatrix}$
7) Given matrix $B = \begin{bmatrix}2 & -1\\3 & 0\end{bmatrix}$ which of the following is matrix A such that AB=A+B?
   $A.\ \frac{1}{2}\begin{bmatrix}1 & 1\\3 & -3\end{bmatrix}$ $B.\ \frac{1}{2}\begin{bmatrix}1 & 2\\-3 & 3\end{bmatrix}$ $C.\ \frac{1}{2}\begin{bmatrix}1 & 1\\-3 & 3\end{bmatrix}$ $D.\ \frac{1}{2}\begin{bmatrix}1 & -1\\3 & -3\end{bmatrix}$
8) Suppose $A = \begin{bmatrix}4 & 0\\1 & 1\end{bmatrix}$ and $B = \begin{bmatrix}2 & 2\\6 & -4\end{bmatrix}$ if X is 2x2 matrix such that $x + \frac{1}{2}B^T = AB$. Then x is equal to: $A.\begin{bmatrix}7 & 5\\5 & -4\end{bmatrix}$ $B.\begin{bmatrix}5 & -3\\5 & 0\end{bmatrix}$ $C.\begin{bmatrix}5 & -3\\5 & 2\end{bmatrix}$ $D.\begin{bmatrix}7 & 5\\7 & 0\end{bmatrix}$
9) If $\begin{bmatrix}2 & -1\\a & 4\end{bmatrix}\begin{bmatrix}1 & b\\-1 & 3\end{bmatrix} = \begin{bmatrix}3 & 1\\-1 & 18\end{bmatrix}$ then what are the values of a and b respectively?
   A. 0,-1 B. -1,2 C. 2.-2 D.3,2
10) Given matrix A= $(0 \quad 1 \quad -3 \quad -1)$, then what is the size of A?
   A. 4×1 B. 4×4 C. 1×1 D. 1×4
11) Let A=$\begin{pmatrix}-5 & 5x-3 & 4\\3 & 8 & y-2\\10 & 3z+5 & 12\end{pmatrix}$ and B= $\begin{pmatrix}-5 & 2x+3 & 4\\3 & 8 & 5y-6\\10 & -3z+17 & 12\end{pmatrix}$, if A=B , then what are the value of x, y and z respectively?
   A. 3,1,1 B. $\frac{11}{3}$, 1,0 C. 2,1,2 D. 2,1,1

100. Let A=$\begin{pmatrix}120 & 110\\ 55 & 60\end{pmatrix}$, what is a matrix B such that A+B is identity matrix?

A. $\begin{pmatrix}-120 & -110\\ -55 & -60\end{pmatrix}$ B. $\begin{pmatrix}-119 & -110\\ -55 & -59\end{pmatrix}$ C. $\begin{pmatrix}-119 & 110\\ 55 & -59\end{pmatrix}$ D. $\begin{pmatrix}120 & 110\\ 55 & 60\end{pmatrix}$

12) Which of the following is the product AB of the two matrices $A=\begin{pmatrix}-2 & 3\\ 1 & 4\end{pmatrix}$ and $B=\begin{pmatrix}-1 & 5\\ 3 & 0\end{pmatrix}$?

A. $\begin{pmatrix}11 & -10\\ 11 & 5\end{pmatrix}$ B. $\begin{pmatrix}-11 & 10\\ 11 & -5\end{pmatrix}$ C. $\begin{pmatrix}-11 & -10\\ 11 & 5\end{pmatrix}$ D. $\begin{pmatrix}-11 & 10\\ 11 & 5\end{pmatrix}$

13) If $f(x)=x^2-5x$ and A=$\begin{bmatrix}1 & -2\\ 2 & -1\end{bmatrix}$, then what is the value of $f(A)$?

A. $\begin{bmatrix}8 & 10\\ 10 & 8\end{bmatrix}$ B. $\begin{bmatrix}1 & -5\\ 4 & -1\end{bmatrix}$ C. $\begin{bmatrix}-8 & 10\\ -10 & 2\end{bmatrix}$ D. $\begin{bmatrix}10 & -8\\ 2 & -10\end{bmatrix}$

14) Let $A=\begin{pmatrix}4 & 4 & -2\\ 2 & 6 & 0\\ 3x & 1 & 3\end{pmatrix}$ and $B=\begin{pmatrix}4 & 2\\ 3 & 0\\ -1 & 5\end{pmatrix}$ are given. If $C=AB$ and $C_{32}=11$, what is the value of x

A. $\frac{3}{5}$ B. $\frac{-4}{3}$ C. $\frac{-2}{3}$ D. -8

15) If $\begin{pmatrix}x & -1\\ 1 & 0\end{pmatrix}\begin{pmatrix}2 & 1\\ 4 & 1\end{pmatrix}=\begin{pmatrix}y & y\\ 2 & 1\end{pmatrix}$, then what is the values of x and y respectively?

A. 3 and 2 B. 2 and 3 C. 1 and 4 D. 4 and 1

16) Let A= $(a_{ij})_{4\times3}$ and B= $(b_{ij})_{p\times q}$, then what is the numbers p and q such that AB is defined? A. $p=4, q=4$ B. $p=4, q=3$ C. $p\in\mathbb{R}, q=3$ D. $p=3, q\in\mathbb{R}$

17) If the order of matrices A and B are 2× 3 and 3× 4 respectively, then what is the order of AB? A. 3× 4 B. 3× 3 C. 2× 4 D. 4× 2

18) If $\begin{pmatrix}4\\ 1\\ 3\end{pmatrix}.A=\begin{pmatrix}-4 & 8 & 4\\ -1 & 2 & 1\\ -3 & 6 & 3\end{pmatrix}$, then what is the matrix A?

A. $(1 \quad 2 \quad -1)$ B. $(-1 \quad 2 \quad -1)$ C. $(-1 \quad 2 \quad 1)$ D. $\begin{pmatrix}1\\ 2\\ -1\end{pmatrix}$

19) LetA=$\begin{bmatrix}1 & -1\\ 0 & 2\\ -3 & 6\end{bmatrix}$Then$A^T$is

A. $\begin{bmatrix}-1 & 1\\ 2 & 0\\ 6 & -3\end{bmatrix}$ B. $\begin{bmatrix}1 & 0\\ -1 & 2\\ -3 & 6\end{bmatrix}$ C. $\begin{bmatrix}-1 & 2 & 6\\ 1 & 0 & -3\end{bmatrix}$ D. $\begin{bmatrix}1 & 0 & -3\\ -1 & 2 & 6\end{bmatrix}$

20) Suppose A=$\begin{bmatrix}\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta\end{bmatrix}$ then AA^T is A. $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ B. $\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}$ C. $\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$ D. $\begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}$

21) Let $A=\begin{pmatrix}1&2&3\\4&5&6\\7&8&9\end{pmatrix}$ and $=\begin{pmatrix}0&1&0\\1&0&0\\0&0&2\end{pmatrix}$, then what is the value of $(AB)^t$?

A. $\begin{pmatrix}1&4&7\\12&8&1\\2&5&3\end{pmatrix}$ B. $\begin{pmatrix}2&5&8\\1&4&7\\6&12&18\end{pmatrix}$ C. $\begin{pmatrix}2&8&4\\4&5&6\\12&6&18\end{pmatrix}$ D. $\begin{pmatrix}1&2&3\\6&12&18\\3&6&3\end{pmatrix}$

22) If $A=\begin{pmatrix}2&0&-1\\1&2&0\\0&0&-1\end{pmatrix}$ and $(2A+B)^T=A^TA$, which 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. $\begin{pmatrix}1&2&0\\0&0&0\\-2&0&4\end{pmatrix}$

23) 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 one of the following is the value of y?

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

24) Suppose $A=\begin{pmatrix}1&2\\2&3\end{pmatrix}$. If A is 2×2 matrix such that $AX-A^T=2A$, then what is the value of X? 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. $\begin{pmatrix}3&0\\0&3\end{pmatrix}$

25) Given a matrix $A=\begin{pmatrix}3&5\\4&6\end{pmatrix}$, then what is symmetric and skew symmetric matrix from A respectively?

A. $\begin{pmatrix}6&9\\9&12\end{pmatrix}$ and $\begin{pmatrix}0&1\\-1&0\end{pmatrix}$

B. $\begin{pmatrix}6&9\\9&12\end{pmatrix}$ and $\begin{pmatrix}6&5\\4&6\end{pmatrix}$

C. $\begin{pmatrix}0&1\\-1&0\end{pmatrix}$ and $\begin{pmatrix}9&6\\12&9\end{pmatrix}$

D. $\begin{pmatrix}12&6\\9&9\end{pmatrix}$ and $\begin{pmatrix}1&0\\0&-1\end{pmatrix}$

26) If $\begin{bmatrix}0&-3&-4\\m&0&8\\4&-8&0\end{bmatrix}$ is symmetric matrix, what is the value of m?

A.1 B.2 C.-3 D.4

27) If $\begin{pmatrix}0&-7&4\\2m-1&0&8\\-6&1-k^2&0\end{pmatrix}$ is skew symmetric matrix , what is the value of m and k?

A. $m=1,k=\pm2\sqrt{2}$ B. $m=3,k=1$ C. $m=-3,k=\pm3,$ D. $m=4,k=\pm3$

28) Given a matrix $=\begin{pmatrix}2&8&4\\4&-5&6\\12&6&18\end{pmatrix}$, then what is trace of B?

A. 25 B. 13 C. 15 D. 14

29) Which one of the following is not true?

A. Identity matrix is scalar matrix B. diagonal matrix is upper triangular matrix

B. Identity matrix is lower triangular matrix D. Diagonal matrix is scalar matrix

30) Which one of the following is Row Echelon Form (REF) matrix?

A. $\begin{pmatrix} a & b & c \\ 0 & 0 & b \\ 0 & b & c \end{pmatrix}$ B. $\begin{pmatrix} x & y & z \\ 0 & -y & 2z \\ 0 & 0 & 0 \end{pmatrix}$ C. $\begin{pmatrix} a & c & b \\ 0 & 0 & 0 \\ 0 & 0 & 3a \end{pmatrix}$ D. $\begin{pmatrix} 2x & y & 4z \\ 0 & 0 & 6x \\ 0 & 0 & 7y \end{pmatrix}$

31) Which one of the following is Reduced Row Echelon Form (RREF) matrix?

A. $\begin{pmatrix} 1 & 0 & c \\ 0 & 1 & b \\ 0 & 0 & 0 \end{pmatrix}$ B. $\begin{pmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{pmatrix}$ C. $\begin{pmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ D. $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

32) $let\ A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 2 \\ 1 & 3 & 1 \end{bmatrix}$. Then the row reduced Row echelon form of matrix A is

A. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$ B. $\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{bmatrix}$ C. $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ D. $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

33) Which of the following is augmented matrix associated to the system of equations $\begin{cases} 2x + y + 3z = 4 \\ x - z = 1 \\ -4x + y - 3 = 0 \end{cases}$

A. $\left[\begin{array}{ccc|c} 3 & 2 & 1 & 1 \\ -1 & 1 & -1 & 3 \\ -1 & -4 & 1 & 4 \end{array}\right]$ B. $\left[\begin{array}{ccc|c} 3 & 1 & 2 & 4 \\ -1 & 0 & 1 & 1 \\ -4 & 1 & -3 & 0 \end{array}\right]$ C. $\left[\begin{array}{ccc|c} 1 & 2 & 3 & 4 \\ -1 & 1 & -1 & 1 \\ -1 & -4 & -1 & 3 \end{array}\right]$ D. $\left[\begin{array}{ccc|c} 2 & 1 & 3 & 4 \\ 1 & 0 & -1 & 1 \\ -4 & 1 & 0 & 3 \end{array}\right]$

34) Which one of the following augmented matrix is written from homogeneous system of linear equations?

A. $\left(\begin{array}{cc|c} 1 & 2 & 1 \\ 1 & 3 & 0 \end{array}\right)$ B. $\left(\begin{array}{cc|c} 2 & 1 & 5 \\ 1 & -3 & 7 \end{array}\right)$ C. $\left(\begin{array}{cc|c} 1 & -1 & 0 \\ -2 & 2 & 3 \end{array}\right)$ D. $\left(\begin{array}{cc|c} 1 & 1 & 0 \\ 1 & -2 & 0 \end{array}\right)$

35) The method of solving system of linear equations by reducing augmented matrix to Row Echelon Form is called _____

A. Gaussian elimination method B. Elimination method C. Gauss-Jordan reduction method D. Jordan elimination method

36) Consider the following system of equations $\begin{cases} x - 3y - 2z = 6 \\ 2x - 4y - 3z = 8 \\ -3x + 6y + 8z = -5 \end{cases}$ is

A. $x = -1, y = -3, z = -2$ C. $x = 1, y = -3, z = 2$

B. $x = -1, y = -3, z = 2$ D. $x = 1, y = 3, z = -2$

37) The solution of the system of linear equation of $\begin{cases} x + y + z = 1 \\ x + 2y + z = 2 \\ -2x - 2y - 4z = -2 \end{cases}$ is

A. $\{(0, 1, 0\}$ B. $(-\infty, \infty)$ C. $\{(-3k, k + 1, k) : k \in \mathbb{R}\}$ D$\{(-3k, k - 1, k) : k \in \mathbb{R}\}$

38) Given the system of linear equation: $\begin{cases} x - 2y + z = 1 \\ -x + y + z = 3 \\ 3x - 5y + z = k \end{cases}$.

How much must be the value of k so that the system has a solution?

A. 7 B. -1 C. 1 D. 0

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

A. $\begin{pmatrix} 4 & -3 \\ -3 & 2 \end{pmatrix}$ B. $\begin{pmatrix} -1 & 2.5 \\ 1 & -2 \end{pmatrix}$ C. $\begin{pmatrix} 4 & -3 \\ -3 & 2 \end{pmatrix}$ D. $\begin{pmatrix} 4 & -3 \\ -3 & 2 \end{pmatrix}$

40) If the matrices $\begin{pmatrix} 3 & x+2 \\ x & 3 \end{pmatrix}$ and $\begin{pmatrix} x+1 & -4 \\ -x & x+1 \end{pmatrix}$ are inverses of each other then the possible value of x is

A. 0 B. -5 C. -1 D. 2

41) If $\begin{pmatrix} x & -3 \\ -1 & y \end{pmatrix}$ is the inverse of $\begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix}$, then what is the value of x and y respectively?

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

42) If A=$\begin{bmatrix} 1 & 2 & 2 \\ 3 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$ then inverse of A is

A. $\begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & 3 \\ 2 & -1 & 5 \end{bmatrix}$ B. $\begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & 3 \\ -2 & -1 & 5 \end{bmatrix}$ C. $\begin{bmatrix} 1 & 0 & -2 \\ -3 & -1 & 6 \\ 2 & 1 & -5 \end{bmatrix}$ D. $\begin{bmatrix} -1 & 0 & 2 \\ 3 & 1 & -6 \\ -2 & -1 & 5 \end{bmatrix}$

43) Which one of the following the inverse of the matrix $\begin{pmatrix} 2 & 3 \\ 3 & 4 \end{pmatrix}$?

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. $\begin{pmatrix} 4 & 0 \\ 0 & 2 \end{pmatrix}$

44) The perimeter of a triangle is 55 cm. the measure of shortest side is 8cm less than the middle side the measure of the longest side 1cm less than the sum of the other two sides. What are the lengths of shortest, middle and longest side respectively?

A. 18, 10, 27 B. 10,18 and 27 C. 27, 18, 10 D. 10, 18, 20

45) A train travels 700 kilometers in the same time that a truck travels 500 kilometers. If the train's average speed is 10 kilometer per hour faster than the truck's speed, what is the speed of train and truck respectively?

A. 35 and 25 B. 25 and 35 C. 15 and 25 D. 25 and 15

46) Almaz, Birkti and Chaltu work in the boutique. One day the three had combined sales sales of Birr 14800. Almaz sold Birr 1200 more than Birkti. Birkti and Caltu combined sold Birr 2800 more than Almaz. How much did Almaz, Birkti and Caltu sell on that particular day respectively?

A. 6000, 4000 and 4800
B. 6000, 4800, 4000
C. 5000, 4800, 4000
D. 4000, 6000 and 4800

47) A farmer has two types of milk, one that is 20% butterfat and another which is 15% butterfat. How much of each should he use to end up with 50 gallons of 20% butterfat?

A. 50 gallons of 20% butterfat B. 30 gallons of 15% butterfat C. 50 gallons of 15% butterfat D. No answer

UNIT FOUR
DETERMINANTS AND THEIR PROPERTIES

1) What is the determinant of a matrix $\begin{pmatrix} 1 & -7 \\ 6 & 5 \end{pmatrix}$?

   A. 47 B. 37 C. -37 D. -47

2) A real number associated with a square matrix is called _____

   A. Inverse of matrix B. Cramer's rule C. cofactor of matrix D. Determinant of matrix

3) The inverse of the matrix $A = \begin{pmatrix} 2 & 1 & 3 \\ 0 & -1 & 2 \\ 4 & 3 & 1 \end{pmatrix}$ is the matrix $A^{-1} = \frac{1}{6}\begin{pmatrix} -7 & 8 & m \\ 8 & -10 & -4 \\ 4 & k & -2 \end{pmatrix}$ where

   A. $m = 3, k = 2$ B. $m = 5, k = -2$ C. $m = 1, k = -3$ D. $m = 2, k = -3$

4) Which one of the following is not true about the determinant a given square matrix A?

   A. The determinant of A is equal to the determinant of its transpose.
   B. Interchanging two rows of A gives the same determinant.
   C. If A contains a row of zeros, then its determinant is zero.
   D. If A has identical rows, then its determinant is zero.

5) What is the determinant of a matrix $\begin{pmatrix} cosx & sinx \\ -sinx & cosx \end{pmatrix}$?

   A. 0 B. cos^2x C. 1 D. sin^2x

6) For what values of x the matrix $A = \begin{pmatrix} x+2 & 6 \\ 2 & x-2 \end{pmatrix}$ is singular?

   A. $x = 3\ or\ x = -3$ B. $x = -4$ C. $x = 4$ D. $x = 4\ or\ x = -4$

7) Let $A = \begin{pmatrix} -2 & 0 & 5 \\ x & -1 & 1 \\ 2x+1 & 2 & -x \end{pmatrix}$ if the minor of an element zero is -16 , then the possible values of x is A. 7, -3 B. 1, 3 C. 3, -5 D. -3, 5

8) Let $A = \begin{pmatrix} -2 & 0 & 5 \\ x & -1 & 1 \\ 2x+1 & 2 & -x \end{pmatrix}$ if the cofactor of an element 5 is 25 , then the values of x is

   A. -1 B. 0 C. 6 D. N-x value

9) If $\begin{vmatrix} -1 & 1 & 2 \\ 3 & 2 & x \\ 2 & 4 & 1 \end{vmatrix} = \begin{vmatrix} -x & 3 & 2 \\ 2 & 2 & 3 \\ 1 & -1 & -2 \end{vmatrix}$, then what is the value of x?

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

10) Suppose A and B are 3×3 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

11) Let A and B be 3×3 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

12) If $\begin{pmatrix} \alpha & 2 & \beta \\ 2 & 1 & 3 \\ -1 & 0 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} -5 \\ 5 \\ 0 \end{pmatrix}$ and the determinant of coefficient matrix is -5, then the value of x is equal to A. 5 B. $\alpha + \beta$ C. -5α D. 3

13) If $M = \begin{pmatrix} 0 & 1 & 2 \\ 3 & -1 & 0 \\ 5 & 2 & 4 \end{pmatrix}$ and $A^T M = 2I$, where A is 3×3 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. $\frac{1}{17}$

14) Let A be 3×3 matrix; If $|A| = 8$, then $|3A|$ is equal to:
A. 11 B. 24 C. 72 D. 216

15) Let A be 3×3 matrix and $|A| = -2$. Then what is the value of $|adj(A)|$?
A. -8 B. -2 C. $-\frac{1}{2}$ D. 4

16) Let $A = (a_{ij})_{3\times3}$ given by $a_{ij} = \begin{cases} 0 \ if \ i > j \\ i + j \ if \ i \leq j \end{cases}$ then what is the value of $|A|$?
A. 46 B. 48 C. $\frac{1}{48}$ D. 24

17) Let A and B be 3×3 matrices. If $|A| = 3$ and $|B| = 2$, then $|2(AB)^{-1}|$ is equal to:
A. $\frac{1}{3}$ B. $\frac{2}{3}$ C. $\frac{4}{3}$ D. $\frac{8}{3}$

18) If $A = \begin{pmatrix} x & -1 \\ 3x & 1 \end{pmatrix}$ then for what value of x is $\det(2A) = x^2$?
A. 16 B. 8 C. 4 D. -8

19) 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. $\left\{(0, {}^{1}/_{a}, {}^{5}/_{b})^t\right\}$ C. $\{(-3, 1, 4)^t\}$ D. $\emptyset$

20) What is the area of triangle with vertices (-3,0), (03) and (1,1)?
A. 4 sq. units B. 1 sq. units C. 2 sq. units D. 2 sq. units

21) Which one of the following set of points are not collinear?
A. (1,0), (2, 2) and (3, 3). C. (1,1), (2, 2) and (3, 3).
B. (1,0), (2, 1) and (3, 2). D. (1,1), (3, 2) and (5, -2).

22) If the area of triangle with vertices (-2, 0), (2, 0) and (0, k) is 8 sq. units, then what is the value of k?
A. $k = 0 \ or \ k = 5$ B. $k = 4 \ or \ k = -4$ C. $k = 3 \ or \ k = -3$ D. $k = 2 \ or \ k = -2$

23) If the points (3, k), (k, 1) and (6, -1) are collinear, then what is the value(s) of k?
A. $k = 0 \ or \ k = 5$ B. $k = 4 \ or \ k = -4$ C. $k = 3 \ or \ k = -3$ D. $k = 2 \ or \ k$

UNIT FIVE: VECTORS

1) Which one of the following quantities represents a vector?
   A. Weight of an object C. speed of a motorbike
   B. Volume of a box D. The width of your bedroom
2) Given two vectors $u = (1, 3)$ and $v = (-3, 5)$. Then $6u + 2v$ is equal to?
   A. $(1, 3)$ B. $(0, 28)$ C. $(4, 5)$ D. $(18, 28)$
3) Which one of the following represents the vector $(3, -5, 7)$ in the space using the standard unit vectors i, j and k?
   A. $3i - 5j - 7k$ B. $3i + 5j - 7k$ C. $3i - 5j + 7k$ D. $-3i + 5j - 7k$
4) Which one of the following is a scalar(dot) product of the vectors $(2, -4, 6)$ and $(-2, -1, 0)$
   A. 0 B. -8 C. 8 D. 6
5) What is the magnitude of the vector whose initial point is at (1, 3) and terminal point is at (4, 1)?
   A. 5 B. 6 C. 1 D. 4
6) Consider the points $A(-2, 1), B(3, 0), C(3, -1)$, and $D(1, 1)$ in xy-plane. If $u = \overrightarrow{AB}$ and $v = \overrightarrow{CD}$, then which one of the following is equal to $u - v$?
   A. $(7, -3)$ B. $(7, 3)$ C. $(-7, 3)$ D. $(1, 3)$
7) A student walks a distance of 3km due east, then another 4km due south. What is the displacement relative to his starting point?
   A. 6km B. 4km C. 5km D. 3km
8) A car travels due east at 60km/hr for 15 minutes, then turns and travels at 100km/hr along a freeway heading due north for 15 minutes. What is the displacement from its starting point
   A. 29.2 B. 30.5 C. 625 D. 850
9) If $\vec{v} = \overrightarrow{AB} + 3\overrightarrow{BA}$ where A and B are distnict 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. $-12\overrightarrow{AB}$
10) If $\vec{u}$ is a unit vector in the direction of $\vec{A}$ and $|\vec{A}| = 4$, then $\vec{A}.\vec{u}$ is equal to…..
   A. $\frac{1}{4}$ B. 4 C. $\frac{1}{2}$ D. 2
11) If $\vec{A}$ and $\vec{B}$ are parallel vector with opposite direction and $|\vec{B}| = |\overrightarrow{2A}|$, then $\vec{B} - \vec{A}$ is equal to
   A. $\vec{A}$ B. $-\vec{A}$ C. $-3\vec{A}$ D. $3\vec{A}$
12) Which of the following is vector that lies on the line through (0, 0) and (2, 4)?
   A. $\vec{u} = (2, 1)$ B. $\vec{u} = (\frac{1}{2}, 2)$ C. $\vec{u} = (-1, -2)$ D. $\vec{u} = (-2, -6)$

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

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

14) A car started moving 9km to the East then moved 4km to the North and then 12km towards West to reach its destination. How far the car it travelled from its starting point?

A. 25km B. 12km C. 4km D. 5km

15) Which of the following is vector equation of the line tangent to the circle $x^2 + y^2 + 2x - 8 = 0$ at (1, 2)?

A. $(x, y) = (0, 3) + t(-1, 2)$ B. $(x, y) = (1, 2) + t(2, -1)$ C. $(x, y) = (0, 3) + t(1, -1)$ D. $(x, y) = (1, 2) + t(-1, 2)$

16) 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. $\frac{-22}{3}$

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

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

18) What is the dot (scalar) product of the vectors $\vec{u} = i + 2j$ and $\vec{v} = -2i + 4j$?

A. -8 B. 4 C. 6 D. 7

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

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

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

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

21) Which of the following is necessarily true?

A. If $|\vec{A}| = |\vec{B}|$, the $\vec{A} = \vec{B}$ C. $|k\vec{A}| = k|\vec{A}|$ for any real number

B. If $\vec{U}$ is in the direction of $\vec{A}$, then $\vec{A}.\vec{U} = |\vec{A}|$ D. if $\vec{A}$is parallel to $\vec{B}$ then $\vec{A}.\vec{B} = 0$

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

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

23) If l is the line that passes through (0, 2) and parallel to $v = i + 3j$, which 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 the circle at the same point p, where $p \neq (0,2)$

C. l intersects the circle at exactly two points

D. The distance between l and the center of the circle is greater than $\sqrt{5}$

24) Suppose $\vec{A} = 3i - 4j$ and $\vec{B}$ is a vector in the xy-plane such that the angle between $\vec{A}$ and$\vec{B}$ is $\frac{\pi}{3}$. $\vec{u}$ 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

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

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

26) If $\vec{A} = 4i - 3j$ and $\vec{u}$ is a unit vector such that $\left|\vec{A} + \vec{u}\right|^2 = 27$, 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

27) A line given by a vector equation $(x, y) = (-t, 6 + 2t), t \in \mathbb{R}$ is tangent to a circle at (1,4). What is the radius of the circle if the center is on the y-axis

A. $\sqrt{5}$ B. $\frac{1}{2}\sqrt{5}$ C. $2\sqrt{5}$ D. $\sqrt{10}$

28) For two non-zero vectors $\vec{a}$ and $\vec{b}$ if $\left|\vec{a} + \vec{b}\right| = |\vec{a}|$, then which of the following is true?

A. $2\vec{a}\vec{b} = \vec{b}\vec{b}$ C. $2\vec{a} + \vec{b}$ *and* $2\vec{a} + \vec{b}$ are parallel

B. $2\vec{a} + \vec{b}$ *and* $\vec{b}$ are perpendicular D. $\vec{a}\vec{b} - \vec{b}\vec{b} = 0$

29) Let $\overrightarrow{PQ}$ be a vector with initial point P=(1, 5) and terminal point Q=(4, 0). If $\vec{v} = xi + 2j$ is parallel $\overrightarrow{PQ}$, then what is the value of x?

A. $\frac{-6}{5}$ B. -3 C. $\frac{-2}{5}$ D. 3

30) Let the angle between $\vec{v} = -2i - j + 2k$ and $\overrightarrow{PQ}$ be $60^{\circ}$where P and Q are points in space. If $\overrightarrow{PQ}.\vec{v} = 5$ then what is the distance between P and Q

A. $\frac{3}{4}$ B. $\frac{10}{3}$ C. $\frac{4}{3}$ D. $\frac{5}{4}$

31) What is the vector equation of the line passing through (2, 4) and parallel to the line $3x - y + 4$?

A. (x,y)=(0,3)+t(-1,2) C. (x,y)=(2,5)+t(2,-1)

B. (x,y)=(2, 5)+t(1, 3) D. (x,y)=(1,2)+t(-1,2)

32) The line L passes through the point (1, -4) and parallel to the vector $\vec{v} = (-2, 5)$. Then which point does not lie on L?

A. (-1, 1) B. (3, -9) C. (-3, 9) D. $(2, \frac{-13}{2})$

33) If $\vec{a} = (4, 3, -2)$ and $\vec{b} = (1, 2, -3)$ are two vectors in space, then which one of the following is not correct?

A. $\vec{a} + \vec{b} = (5, 5, -1)$ C. $\vec{a} + \overrightarrow{2b} = (6, 7, -1)$

B. $\vec{b} - \vec{a} = (-3, -1, -5)$ D. $\vec{a} - 2\vec{b} = (2, 1, 8)$

34) Let $\vec{a} = 2i + mj + k$ and $\vec{b} = 4i - 2j - 2k$. What is the value of m if $\vec{a}$ and $\vec{b}$ are perpendicular to each other?
A. 3 B. 5 C. 6 D. -6

35) If $|2\vec{a} + \vec{b}| = |2\vec{a} - \vec{b}|$. Then what is the angle between $\vec{a}$ and $\vec{b}$?
A. $\frac{\pi}{6}$ B. $\frac{\pi}{3}$ C. $\frac{\pi}{4}$ D. $\frac{\pi}{2}$

36) Let $|\vec{a}| = 13, |\vec{b}| = 19$ and $|\vec{a} + \vec{b}| = 24$. What is the value of $\vec{a}.\vec{b}$?
A. 22 B. 23 C. 88 D. 247

37) If $\vec{a} = i + 2j$, $\vec{b} = -i + 2j$ and $\vec{c} = 3i + j$, then what is the value of t such that $\vec{a}i + t\vec{b}$ is perpendicular $\vec{c}$
A. 6 B. 12 C. 24 D. 5

38) Let $\vec{v} = (1, 7)$ and $\vec{u} = (4, 3)$, what is the angle between $\vec{v}$ and $\vec{u} - \vec{v}$?
A. $\frac{3\pi}{4}$ B. $\frac{2\pi}{3}$ C. $\frac{\pi}{4}$ D. $\frac{\pi}{2}$

39) Which one of the following is not true
A. Any vector can be expressed as positioned vector
B. A vector whose magnitude is one is unit vector
C. Any vector can express as linear combination of unit vectors i and j
D. The cross product two vectors is equal to scalar.

40) Which one of the following is area of quadrilateral whose vertices are $A(1, 0), B(3, 5), C(7, 2)$, and $D(5, -2)$.
A. 11sq.unit B. 12 sq.unit C. 33 sq.unit D. 23 sq.unit

41) In order to find a point p in space one can start from the origin $O(0, 0, 0)$; moves 5 units in the direction negative x-axis, then move 5 units in the direction positive x-axis and finally move 5 units in the direction of negative z-axis. Which one of the following is ordered triple of numbers represented by a point P?
A. $(5, 5, 5)$ B. $(-5, 5, -5)$ C. $(5, -5, 5)$ D. $(-5, -5, 5)$

42) A conveyor belt generates a force $\vec{F} = 5i - 3j + 3k$ that move a suitcase from point P(1, 1, 1) and Q(9, 4, 7) along a straight line. What is the work done by the conveyor belt?
A. 49J B. 55J C. 9J D. 45J

43) Which one of the following is the area of triangle whose vertices are $A(3, -1, 2), B(1, -1, -3), and\ C(4, -3, 1)$?
A. $\frac{\sqrt{15}}{2}$ B. 65 C.29 D. $\frac{\sqrt{165}}{2}$

44) Which one of the following is the area of Quadrilateral whose vertices are $A(1, 0), B(3, 5), C(7, 2), and\ D(5, -2)$?
A. 11 B. 23 C. 12 D. 5

45) What is equation of the circle whose end points of the diameter are $p(2, 1) and\ Q(6, 3)$?
A. $x^2 + y^2 + 8x - 4y = 15$ C. $x^2 + y^2 - 8x - 4y = -15$
B. $x^2 + y^2 - 8x - y = 0$ D. $x^2 + y^2 + x - 13y = 34$

46) What is equation of the circle centered at $C(-4,2) and\ passing\ through\ (2,-5)$?

C. $x^2+y^2+x-13y=-34$ C. $x^2+y^2+13x-13y+4=0$

D. $x^2+y^2+8x-4y-65=0$ D. $x^2+y^2+x-13y=34$

47) The parametric equation of the line passing through (1, 2) and perpendicular to the line $3x-9y+5$?

A. $(x,y)=(1+t,1-3t)$ C. $(x,y)=(1-t,1+3t)$

B. $(x,y)=(3-t,1+4t)$ D. $(x,y)=(3+t,1-t)$

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

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

49) A plane leaves the airport on the bearing of 45° traveling at 400km/h if the bearing angles are measured clockwise from north. The wind is blowing at bearing of 135° at a speed of 40km/h. what is the actual velocity of the plane?

A. 311.08km/h B. 282,8 km/h C. 402 km/h D. 28.8 km/h

UNIT SIX: TRANSFORMATIONS OF THE PLANE

1) Which one of the following is not rigid transformation of the plane?
   C. translation C. Stretching
   D. Reflection D. Rotation
2) If a translation T takes the (3,-5) point to the point$(1,4)$, what is the image of the circle $x^2+y^2-3x+5y=0$?
   A. $x^2+y^2+x-13y=-34$ C. $x^2+y^2+13x-13y+4=0$
   B. $x^2+y^2+13x-y+34=0$ D. $x^2+y^2+x-13y=34$
3) What is the image the point (5, 1) when it is rotated 270° clockwise, then reflected over the line $x=4$
   A. $(7,-5)$ B. $(9,5)$ C. $(9,-5)$ D. $(5,9)$
4) Which one of the following is the image of point A$(-1,1)$ after reflection in the line $y=3$
   A. $(-1,5)$ B. $(1,5)$ C. $(7,1)$ D. $(1,7)$
5) Which one of the following is the image of point A$(-1,5)$ after reflection in the line $x=1$
   A. $(-1,5)$ B. $(5,3)$ C. $(-5,3)$ D. $(3,5)$
6) Which one of the following is a transformation that occurs when every point of a figure is moved from one location to another location along the same direction through the same distance
   A. Reflection C. Identity transformation
   B. Translation D. Rotation
7) Which one of the following statement is not true?
   A. Every circle with center at the center of rotation is fixed
   B. The image of circle with center at origin reflected about the line $y=x$ is it self.
   C. Reflection is one to one correspondence
   D. Translation followed by reflection is equal to reflection followed by translation.
8) What is the image of the point A(-6, -4) with respect to the translation $(x,y)\rightarrow(x-3,y+4)$?
   A. $(-9,0)$ B. $(-9,-8)$ C. $(-4,9)$ D. $(0,-9)$
9) What is the image of a point A(5, 3) when it is reflected over the y-axis, then rotated 90° clockwise?
   A. $(3,-5)$ B. $(-5,3)$ C. $(-5,-3)$ D. $(3,5)$
10) If a translation T takes (-1, 1) to a point (3, 2), the image of the circle $x^2+y^2-2x+4y+1=0$ under T is ?
   B. $(x-3)^2+(y-3)^2=4$ C. $(x-5)^2+(y+1)^2=4$
   C. $(x-2)^2+(y+1)^2=4$ D. $(x+3)^2+(y+3)^2=4$

11) Let T be a translation that takes the origin into (2, 3). Then which of the following is true about the translation T?
   A. $(x-4)^2+(y+3)^2=12$ is the translation of $(x-2)^2+(y+6)^2=12$
   B. $(x+4)^2+(y-3)^2=12$ is the translation of $(x-2)^2+(y+6)^2=12$
   C. $(x-4)^2+(y-3)^2=9$ is the translation of $(x-2)^2+(y+6)^2=9$
   D. $(x-5)^2+(y-6)^2=9$ is the translation of $(x-3)^2+(y-3)^2=9$

12) If the image of the line $2x-3y=7$ under a translation is $2x-3y=0$ which one of the following is translation vector of the translation line?
   A. $(2,-1)$ B. $(-2,1)$ C. $(-1,2)$ D. $(1,-2)$

13) A translation takes $x^2+(y+1)^2=5$ to $(x-2)^2+y^2=5$ what is the image of (1, 3) under this transformation?
   A. $(3,4)$ B. $(3,2)$ C. $(-1,2)$ D. $(-2,3)$

14) What is the image of circle $(x+1)^2+(y-3)^2=5$, when translated by the vector $\overrightarrow{PQ}$ where P=(1, -1) and Q= (-4, 3)
   A. $(x-6)^2+(y+3)^2=5$ C. $(x+7)^2+(y-6)^2=5$
   B. $(x+6)^2+(y-7)^2=5$ D. $(x+6)^2+(y+7)^2=5$

15) If the line T takes the point (1, 2) to (3, 4), then T takes the line L:$2x+3y+6=0$ to:
   A. $2x+3y-16=0$ C. $2x+3y+16=0$
   B. $2x+3y-4=0$ D. $3x+2y-4=0$

16) What is the image of a point (2, 1) after reflection in the line $x+y=0$?
   A. (2,-1) B. (-2,1) C. (-1,-2) D. (1,-2)

17) If a translation that sends to (0, 0) to (3, -2), and M is a reflection that maps (0, 0) to (2, 4), what is the value of $T(M(1,3))$?
   A. $(0,-1)$ C. $(3,2)$
   B. $(4,1)$ D. $(-1,0)$

18) What is the image of the line $s: y=x+4$ after it has been reflected in the line $l: y=x-3$?
   A. $y=x+1$ B. y=2x+1 C. $y=x-10$ D. $y=x-5$

19) The image of the circle $x^2+y^2-x+2y=0$ when it is reflected about the line L is $x^2+y^2-2x+y=0$, then what is equation of L?
   A. $y=x+1$ B. $x+y=0$ C. $y-x=0$ D. $y+x=5$

20) Let L be a line given by a vector equation$(x,y)=(-2,1)+t(1,1), t\in\mathbb{R}$, which one of the following is the image of L after being translated by the vector $u=(2,-1)$ followed by the rotation through 45° about the origin.
   B. $y=\sqrt{2}x$ B. $\sqrt{2}$ C. $x=0$ D. $-2\sqrt{2x}$

21) If p is the reflection of the point (4, -4) in the line $2y=x+1$, what is the coordinates of p

A. $(-\frac{6}{5},\frac{32}{5})$ B. $(-\frac{32}{5},\frac{32}{5})$ C. $(\frac{6}{5},-\frac{32}{5})$ D. $(\frac{6}{5},\frac{32}{5})$

22) What is the image of the circle $x^2+y^2-4x-6y+12=0$ when it reflected with respected to the line $y=-x$

A. $(x+3)^2+(y+2)^2=1$ C. $(x-2)^2+(y-3)^2=1$

B. $(x+2)^2+(y+3)^2=1$ D. $(x-3)^2+(y-2)^2=1$

23) Let L be a line whose equation is $2x-y=10$ which one of the following is the equation of image of L after reflection in the line $y=2x-5$ followed by the rotation through 90° about the origin.

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

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

B. $2x+3y=7$ C. $x+3y=7$

C. $8y+2x=19$ D. $2x+3y+5=0$

25) What is the image of the point p(3,0) when it is rotated through $-150°$?

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

26) In a reflection the image of a line $y-2x=3$ is the line $2y-x=9$. What is the axis of reflection?

B. $y=2x-12$ B. $y=-3x-12$

C. $y=3x+12$ D. $y=-3x+12$

27) What is the image of the line given by $(x,y)=(-1,0)+t(3,6), t\in\mathbb{R}$ under the translation that takes (1, 0) to (0, 1)followed by the reflection about the line $y=2x$

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

28) If a translation T takes the circle $x^2+y^2-2x+6y+3=0$ into the circle whose equation is $(x+2)^2+(y-4)^2=7$. What is the image of the origin under T?

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

29) The image a figure with vertices A$(1,2)$, B. $(3,6)$, C. $(-1,2)$, D. $(-2,-2)$ after reflection across the x-axis

A. A'$(1,-2)$, B' $(-3,-6)$, C' $(1,-2)$, D'$(2,2)$

B. A'$(1,-2)$, B' $(3,-6)$, C' $(-1,-2)$, D'$(-2,2)$

C. A'$(-1,2)$, B' $(-3,6)$, C' $(1,-2)$, D'$(2,-2)$

D. A'$(1,-2)$, B' $(3,6)$, C' $(-1,2)$, D'$(-2,-2)$

30) What is the translation vector $u=(h,k)$ so that the equation $x^2+2y^2+6x-8y+15=0$ is transformed to an equation of the form $x^2+2y^2+d=0$ where d is constant

A. $(-3,2)$ B. $(3,-2)$ C. $(-2,3)$ D. $(2,-3)$

31) What is the image of the circle $x^2+y^2-4x-6y+11=0$ when the origin is shifted to the points (1, 1) after translation axes?

B. $x^2+y^2-6x-8y+23=0$ C. $x^2+y^2+6x+8y-23=0$

C. $x^2+y^2-4x-6y+3=0$ D. $x^2+y^2-4x-2y+3=0$

32) When the plane is rotated 45° about a point (1, -2), what would be the image of the point (2, 4)?

B. $(1-\frac{5\sqrt{2}}{2}, -2+\frac{7\sqrt{2}}{2})$ C. $(\frac{5\sqrt{2}}{2}, \frac{7\sqrt{2}}{2})$

C. $(-1+\frac{5\sqrt{2}}{2}, -2-\frac{7\sqrt{2}}{2})$ D. $(1+\frac{5\sqrt{2}}{2}, -2-\frac{7\sqrt{2}}{2})$

33) What is the image of the circle $(x-3)^2+(y+5)^2=1$ when it is rotated through $\frac{5\pi}{3}$ about the point (4, -3)?

B. $(x-\frac{7}{2}+\sqrt{3})^2+(y+4-\frac{\sqrt{3}}{2})^2$ C. $(x+\frac{7}{2}+\sqrt{3})^2+(y-4-\frac{\sqrt{3}}{2})^2=1$

C. $(x-\frac{7}{2}-\sqrt{3})^2+(y+4+\frac{\sqrt{3}}{2})^2=1$ D.$(x+\frac{7}{2}-\sqrt{3})^2+(y-4+\frac{\sqrt{3}}{2})^2=1$

34) Let L be a line given by a vector equation $(x,y)=(1,1)+t(\sqrt{3},1), t\in\mathbb{R}$, which one of the following is the image of L after being rotated 15° about (1, 1) then translated by vector $u=(-1,1)$.

A. $x-y=2$ C.$-x+y=2$

B. $\sqrt{3}x-y=2$ D. $-x+\sqrt{3}y=1$

35) What is the translation vector $V=(h,k)$ so that the equation $x^2+y^2+8x-10y+5=0$ is transformed to an equation of $x^2+y^2-2x+6y-26=0$?

A. $V=(-8,5)$ B. $V=(-8,-5)$ C. $V=(-5,-8)$ D. $V=(5,-8)$

36) Let an equation of a circle $(x-2)^2+(y-3)^2=25$ then what is the equation of the image of circle after a reflection about the line$y=x+3$?

B. $x^2+(y-)^2=25$ C. $(x-5)^2+y^2=25$

C. $(x+2)^2+(y+3)^2=25$ D. $(x-2)^2+(y-3)^2=50$

37) In rotation R, the image of (3, 5) is (-2, 4) and the image of (1, 4) is (-1, 2), then what is center of rotation and image of $(-1,0)$ respectively?

A. $(3,2):(3,0)$ B. $(2,2):(0,3)$ C. $(2,1):(3,0)$ D. $(1,2):(3,0)$

38) What is the image of the line $s: y=2x+1$ after it has been reflected in the line $l: y=3x+2$?

A. $2y=11x+9$ B. 2y=11x+1 C. $2y=9x+11$ D. $y=2x+1$

39) The image the point (2, 2) reflected in the line passing through the origin and making 30° whith the x-axis…

B. $(2,-2)$ C. $(1+\sqrt{3}, \sqrt{3}-1)$

C. $(\sqrt{3}-1, 1+\sqrt{3})$ D. $(\sqrt{3}, -\sqrt{3})$

40) If M is a reflection in the line $y=-x$ and R is a rotation about the origin through 90° , what is $M(R(3,0))$ and $R(M(3,0))$ respectively?

A. $(3,0):(3,0)$ C. $(-3,0):(0,3)$

$(-3,0):(3,0)$ D. $(3,0):(-3,0)$

UNIT 7: STATISTICS

1) Which one of the following is not continuous data?
   A. Weight of package ready to be shipped
   B. Rank of students by examination results
   C. Students' grade level
   D. Volume of water in glass

2) Among students who took a quiz, 15 students scored 6, 20 students scored 7, 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

3) The time needed to type a sample of 8 business letters in an office is 7, 8, 6, 8, 9, 7, 5, 6 minutes. What is the mean ($\bar{x}$) and the standard deviation (sd) of the data in minute?
   A. $\bar{x} = 7,\ sd = \sqrt{1.5}$
   B. $\bar{x} = 7,\ sd = \sqrt{2}$
   C. $\bar{x} = 8,\ sd = \sqrt{2}$
   D. $\bar{x} = 8,\ sd = \sqrt{1.5}$

4) Consider the following frequency distribution table.

Value	5	3	7	6	8
Frequency	3	4	5	3	5

Table 1

   What is the sixth decile?
   A. 7.5 C. 6.5 B. 7 D. 5

5) Which one of the following is not true about measures of central tendency?
   A. Mean is not affected by extreme values
   B. Both mean and median are unique for a given set of data
   C. Median and mode are not affected by extreme values
   D. Mode is used for both quantitative and qualitative data

6) The age distribution of students in a certain class is given below.

Age	10-14	15-19	20-24	25-29
No. Of students	2	10	6	7

   What is the modal value of the distribution?
   A. 18.83 B. 17.33 C. 18.33 D. 18.73

7) The following is a frequency distribution table of a grouped data with variable X.

X	3-7	8-12	13-17	18-22
Frequency	4	6	8	2

   What is the mean ($\bar{x}$) and the variance (δ^2) of the data respectively?
   A. $\bar{x}, = 12, \delta^2 = 21$
   B. $\bar{x} = 12, \delta^2 = 25$
   C. $\bar{x} = 13, \delta^2 = 9$
   D. $\bar{x} = 13, \delta^2 = 16$

8) 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 the standard deviation will increase.

D. Mean age and the standard deviation will stay the same.

9) Marks obtained by 40 students in a short assessment are given below where a and b are missing data

Marks	5	6	7	8	9
No.of students	6	a	16	13	b

If the mean of the distribution is 7.2, what are the values of a and b respectively?

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

10) The first group of 10 children has a mean weight of 15.6 kg, and the second group of another 10 children has a mean weight of 16 kg, and the third group of children has a mean weight 20kg. If the mean weight of all children is 17 kg, what is the total number of children in all of the three groups?

A. 28 B. 29 C. 30 D. 32

11) 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

12) 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. $\sqrt{2.3}$ C. 3 D. $\sqrt{3.6}$

13) A school has three class rooms 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 an 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

14) The mark of students scored in an examination is grouped in class intervals as shown below.

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

What is the median of the mark?

A. 25.0 B. 75.5 C. 77.5 D. 79.5

15) 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 in terms of $\bar{x}$?

A. $10\bar{x} - 90$ B. $9\bar{x} - 90$ C. $5\bar{x} - 90$ D. $5\bar{x} - 45$

16) The following is the frequency distribution of a grouped data.

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

What is the mean and the 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, $\sqrt{15}$

17) If $\mathbf{Q_i}$, $\mathbf{D_i}$, and $\mathbf{P_i}$ are respectively the ith-quartile, decile and percentile of a data arranged in increasing order, then which one of the following is necessarily true?

A. $Q2 = \frac{Q1+Q3}{2}$ C. $P_{25} > Q_1$

B. $D_3 > P_{25}$ D. $Q = mean\ of\ the\ data$

18) The following is a set of data representing the average mark of 13 students: 91, 89, 93, 91, 87, 94, 92, 85, 91, 90, 96, 93, and 89. Then which of the following statements is true about the data?

A. The median is 90.5 C. The range of the mark is 11.

B. The upper quartile is 92 D. The mean is 91.5

19) A measurement is grouped into five class intervals with the following frequency distribution.

Class interval	5-15	15-25	25-35	35-45	45-55
frequency	22	40	68	50	20

What are the **first** quartile **Q1** and the **75th** percentile **P75** of the measurement?

A. 22 B. 48 C. 16 D. 22.25

20) 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 δ^2 of the data?

A. $\overline{X} = 5, \delta^2 = 0.7$ B. $\overline{X} = 6, \delta^2 = 1.4$ C. $\overline{X} = 6, \delta^2 = 0.7$ D. $\overline{X} = 5, \delta^2 = 1.4$

21) The mark of 50 students is given below:

Marks	0-10	10-20	20-30	30-40	40-50
NO. Of students	5	8	f_1	10	f_2

If the median of the data is 26, what are the values of 1 and 2 ?

A. $f_1 = 7, f_2 = 20$ C. $f_1 = 15, f_2 = 12$

B. $f_1 = 12, f_2 = 15$ D. $f_1 = 20, f_2 = 7$

22) One group 50 student has a mean score 30 in exam. A second group of 100 student has a mean score of 40. What is the mean of all the 150 student?

A. 40 B. 36.7 C. 36 D. 150

23) The following represents the number of minutes that 25 students spent studying for a math test.

Studying time (in minutes)	$0 \le t < 10$	$10 \le t < 20$	$20 \le t < 30$	$30 \le t < 40$	$40 \le t < 50$
No of students	2	10	F_1	4	F_2

If the mode of the data is 16.67, what are the values of F_1 $and F_2$?

A. $F_1 = 6,\ F_2 = 2$ C. $F_1 = 4,\ F_2 = 3$

B. C. $F_1 = 3,\ F_2 = 6$ D. $F_1 = 6,\ F_2 = 3$

24) If the mean of $a, b, c, d\ is\ k$, then what is the mean of $a + b, 2b, c + b, b + d$?

A. $k + b$ B. bk C. k D. $k - b$

25) 0. In an examination, the mean of marks scored by a class of 40 students was calculated as 72.5. Later on, it was detected that the marks of one student were wrongly copied as 48 instead of 84. What is the correct mean.

A. 72.5 B. 74.5 C.2936 D. 73.4

26) The mean monthly salary of 12 employees of a firm is Birr1450. If one more person joins the firm who gets Birr1645 per month, what will be the mean monthly salary of 13 employees?

A. 1645 B. 1465 C. 78 D. 25

27) The daily rainfall for the last five days was 60, 90, 150, 210, 240. For the next five days, the amount of rainfall was doubled each, i.e., 120, 180, 300, 420,and 480. What is the mean, variance and standard deviation of the doubled rain fall respectively.

A. 150, 520, $\sqrt{520}$ B. 150, 2080, $\sqrt{2080}$ C. 300, 2080, $\sqrt{2080}$ D. 300, 520, $\sqrt{520}$

28) The following represents marks obtained in mathematics exam (out of 60)

What is the minimum pass mark if 70% of the student to pass ?

Marks	$30 - 34$	$35 - 39$	$40 - 44$	$45 - 49$	$50 - 54$	55-59
Number of students	7	12	3	5	3	6

A. 10.8 B. 36.58 C. 35 D. 48.2

29) In a small business 2 cleaners earn Birr 340 each, 6 persons handling the machinery earn Birr 600 each, the manager earns Birr 1500 and the director Birr 3500 per month. Which measure best represents these data?
A. Mode B. Mean C. Median D. Standard deviation

30) If the population function x has mean $M(x) = 4$ and mean $M(x^2) = 24$, then what is its standard deviation?
1. $\sqrt{2}$ B. 2 C. 4 D. $2\sqrt{2}$

UNIT 8: PROBABILITY

1. A private college has 1000 students. 60% of these students are males, 45% of these students pay their payment by credit card including 175 females. What is the probability that the student is a male or a credit card user?
A. 0.675 B. 0.225 C. 0.325 D. 0.775
2. Let $A = \{1, 2, 3, 4, 5, 6, 7\}$ and $B = \{7, 8, 9)$ and $C = \{8, 9, 10\}$. If one of the numbers is deleted randomly from each of these sets, what is the probability that all of the three deleted numbers are even or all are multiple of 3?
A. $\frac{4}{5}$ B. $\frac{2}{21}$ C. $\frac{1}{9}$ D. $\frac{8}{63}$
3. Suppose 2500 items are produced by a machine and 2% of the product are randomly selected and tested. If 5 of the tested items have a defect, then what is the probability that an item produced by a machine has No defect?
A. 0.80 B. 0.85 C. 0.90 D. 0.95
4. Fatuma can solve 90% of the problems given in a book and Samuel can solve 70%. What is the probability that at least one of them will solve the problem?
A. 0.77 B. 0.87 C. 0.97 D. 0.67
5. Two machines A and B produce respectively 60% and 40% of the total number of items of a factory. The percentages of defective of these machines are 2% and 5%, respectively. If an item is selected at random, then what is the probability that the item is defective?
A. 0.032 B. 0.07 C. 0.32 D. 0.426
6. If there are two children in a family, what is the probability that there is at least one girl in the family?
A. $\frac{1}{2}$ B. $\frac{1}{4}$ C. $\frac{3}{4}$ D. $\frac{2}{3}$
7. The probability that an electronic device produced by a company does not function properly is equal to 0.1. If two devices are bought, then what is the probability that at least one device function properly?
A. 0.81 B. 0.09 C. 0.18 D. 0.99

8. A team of 10 researchers consists of 4 biologists and 6 chemists. If 3 persons are chosen randomly from the team, what is the probability that at least one is a biologist?

   A. $\frac{2}{3}$ $\frac{2}{5}$ C. $\frac{5}{6}$ D. $\frac{7}{10}$

9. 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

10. 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 C. 0.5 D. 0.7

11. Items produced by a certain company are subjected to two kinds of defects D_1 and D_2. Out of the total product 5% have the defect D_3, 10% have the defect D_2, and 2% have both defects. What is the probability that a randomly selected item has neither defect D_1 or D_2?

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

12. How many 5 digit even numbers can be formed from 1,2,3,4,5,6,7 and 8 , if the numbers start with 5

    A. 64 B. 2048 C. 248 D. 2000

13. 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

14. A three-digit library identification card is to be printed from the numbers 0,1, 2,3,4,5 in a way that the first is non-zero and no number is to be repeated. How many such cards can be printed?

    A. 100 B. 120 C. 150 D. 180

15. A student needs to select 3 books from 3 mathematics, 3 physics and 1 history book. What is the probability 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. $\frac{18}{35}$

16. 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

17. How many three digit numerals greater than 300 hundred can we write using the digits 1, 2, 3, 4, 5 without replacement?

    A. 12 B. 60 C. 4 D. 3

18. 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. $\frac{1}{6}$

19. A group of six students take their seats at random in a round table for a discussion. What is the probability that two specific students do not sit together?

A. $\frac{5}{6}$ B. $\frac{2}{3}$ C. $\frac{1}{3}$ D. $\frac{1}{6}$

20. A box contains 5 white 6 red and 4 black balls of identical size. If 3 balls are randomly taken out from the box one after the other, what is the probability that the first ball is white and both the second and the third are red?

A. $\frac{2}{15}$ B. $\frac{3}{15}$ C. $\frac{4}{75}$ D. $\frac{5}{91}$

21. How many different arrangements can be made from the letters in the word "MATHEMATICS", if the arrangements start with by M.

A. 90200 B.42300000 C. 200 D. 907200

22. 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. 4220

23. A company produced 25,000 bulbs and randomly tested 2% of the product. Among the tested bulbs, if 40 have defect of D1, 60 have defect of D2 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

24. If S is a set with 10 elements and A ⊆ 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. $\frac{7}{128}$

25. Suppose that the first 3 letters (A, B and C) and number digits are to be used to form car plates in a small town. How many different plates can be formed in a total that contain 1, 2 or 3 letters and then followed by 3 digits?

A. 3,000 B. 27,000 C. 39,000 D. 100,000

26. 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 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! × 10!

27. 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

28. A box contains 10 items of which 3 are defective. If two 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. $\frac{49}{100}$

29. In how many ways can a committee of 3 members be formed from 7 candidates?

A. 7 B. 21 C. 28 D. 35

30. Let A and B be two events. Suppose that the probability that neither event occurs is $\frac{3}{8}$. What the probability that at least one of the events occur?

A. $\frac{1}{8}$ B. $\frac{5}{8}$ C. $\frac{1}{4}$ D. $\frac{3}{4}$

31. Items produced by a certain company are subjected to two kinds of defects D1 and D2. Out the total production, if 5% have defect D1, 10% have defect D2 and 2% have both defects, then what is the probability for an item that have defect D2, given that it has defect D1?

A. 0.2 B. 0.05 C. 0.1 D. 0.4

GOOD LUCK!