

BOOKLET CODE: 01

SUBJECT CODE: 02

ALLOWED: 3 HOURS

GENERAL DIRECTIONS

THIS BOOKLET CONTAINS MATHEMATICS REMEDIAL EXAMINATION. THE SUBJECT CODE FOR THIS EXAMINATION IS 02 AND THE CODE FOR THIS PARTICULAR BOOKLET IS 01 PLEASE COPY THESE CODES ON YOUR ANSWER SHEET WHERE IT READS BOOKLET CODE. AND SUBJECT CODE. THEN, BLACKEN THE CORRESPONDING BOXES IN THE COLUMNS BELOW EACH NUMBER.

IN THIS EXAMINATION, THERE ARE A TOTAL OF 40 MULTIPLE CHOICE ITEMS. ATTEMPT ALL THE ITEMS. YOU WILL BE ALLOWED TO WORK FOR 3 HOURS. IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY GO BACK AND REVIEW. WHEN TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING, LAY YOUR PENCIL DOWN, AND WAIT FOR FURTHER INSTRUCTIONS.

ANY FORM OF CHEATING OR AN ATTEMPT TO CHEAT IN THE EXAMINATION HALL WILL RESULT IN AN AUTOMATIC DISMISSAL FROM THE EXAMINATION HALL AND CANCELLATION OF YOUR SCORE(S).

PLEASE MAKE SURE THAT YOU HAVE WRITTEN ALL THE REQUIRED INFORMATION ON THE ANSWER SHEET BEFORE YOU START TO WORK ON THE EXAMINATION.

1) Which of the following is the equation of a line perpendicular to the line $y = 2x + 5$?

- a) $y = 2x + 3$
- b) $y = -2x - 5$
- c) $y = -1/2x + 3$
- d) $y = 1/2x - 5$

2) What is the value of the constant k if the function $f(x) = x^3 + kx^2 + 2x - 3$ has a horizontal tangent at $x = 1$?

- a) -2
- b) -1
- c) 0
- d) 2

3) Which of the following is the equation of the tangent line to the curve $y = x^2 + 3x - 2$ at the point $(1, 2)$?

- a) $y = 2x - 4$
- b) $y = 2x + 1$
- c) $y = 3x - 1$

d) $y = 3x + 1$

4) What is the value of the integral $\int (x^3 - 2x^2 + x + 1)dx$ from $x = 0$ to $x = 2$?

a) $1/2$

b) 2

c) $9/2$

d) $10/3$

5) Which of the following is the equation of a circle with center $(-2, 3)$ and radius 5?

a) $(x + 2)^2 + (y - 3)^2 = 5$

b) $(x - 2)^2 + (y + 3)^2 = 25$

c) $(x + 2)^2 + (y - 3)^2 = 25$

d) $(x - 2)^2 + (y + 3)^2 = 5$

6) Find the solution to the equation $\sin(x) + \cos(x) = 1$ for x in the interval $[0, 2\pi]$.

a) $\pi/4$

b) $\pi/2$

c) $3\pi/4$

d) π

7) Which of the following is the equation of the normal line to the curve $y = x^2 - 4x + 3$ at the point $(2, -1)$?

a) $y = -x/2 - 2$

b) $y = -2x - 5$

c) $y = x/2 - 2$

d) $y = 2x + 3$

8) What is the value of the derivative of $\ln(x^2 + 1)$ with respect to x ?

a) $2x/(x^2 + 1)$

b) $2x$

c) $x/(x^2 + 1)$

d) $1/(x^2 + 1)$

9) Find the solution to the equation $e^{(2x)} - 3e^x + 2 = 0$.

a) $x = \ln(2)$

b) $x = \ln(1/2)$

c) $x = \ln(1) = 0$

d) $x = \ln(3)$

10) Which of the following is the equation of the plane that passes through the points (1, 2, 3), (2, 3, 5), and (4, 5, 7)?

a) $2x - y + z = 1$

b) $x - 2y + z = 3$

c) $x + y - 2z = 0$

d) $x + y + z = 6$

11) If the solution for $\{ax + by = 32, bx + 3ay = 7\}$ is (1,1), then the values of a and b respectively are

A. $a=1, b=2$

C. $a=-1, b=1$

B. $a=2, b=1$

D. $a=1, b=1$

12) What is the limit of $f(x) = (x^2 - 1)/(x - 1)$ as x approaches 1?

a) 0

b) 1

c) 2

d) Does not exist

13) Find the derivative of $f(x) = 3x^4 - 2x^3 + 5x^2 - 7x + 1$.

a) $12x^3 - 6x^2 + 10x - 7$

b) $12x^3 - 6x^2 + 10x + 1$

c) $3x^5 - 2x^4 + 5x^3 - 7x^2$

d) $3x^5 - 2x^4 + 5x^3 - 7x$

14) Find the integral of $f(x) = 2x + 3$ with respect to x.

- a) $x^2 + 3x + C$
- b) $x^2 + 3x$
- c) $x^2 + C$
- d) $2x^2 + 3x + C$

15) Find the equation of the tangent line to the curve $y = x^3 - 2x^2 + 5x - 1$ at the point (2, 7).

- a) $y = 3x + 1$
- b) $y = 3x - 5$
- c) $y = 4x + 3$
- d) $y = 4x - 9$

16) Find the critical points of the function $f(x) = x^4 - 4x^3 + 6x^2 - 8x + 2$.

- a) $x = -1, x = 2$
- b) $x = 0, x = 2$
- c) $x = -1, x = 0, x = 2$
- d) $x = -2, x = -1, x = 2$

17) Find the local maximum and minimum values of the function $f(x) = x^3 - 3x^2 + 2x + 1$.

- a) Local maximum at $x = -1$, local minimum at $x = 2$
- b) Local maximum at $x = 2$, local minimum at $x = -1$
- c) Local maximum at $x = 1$, local minimum at $x = 2$
- d) Local maximum at $x = -2$, local minimum at $x = 1$

18) Find the derivative of $f(x) = \ln(2x + 1)$.

- a) $1/(2x + 1)$
- b) $2/(2x + 1)$
- c) $\ln(2x + 1)$
- d) $2x/(2x + 1)$

19) Find the solution to the differential equation $dy/dx = 2x$ with initial condition $y(0) = 1$.

- a) $y = x^2 + 1$

- b) $y = x^2$
- c) $y = x^2/2 + 1$
- d) $y = x^2/2$

20) Find the area of the region bounded by the curve $y = x^2$ and the lines $x = 1$ and $x = 2$.

- a) $1/3$
- b) $3/2$
- c) $7/3$
- d) $8/3$

21) Find the volume of the solid generated by revolving the region bounded by the curves $y = x^2$ and $y = x$ around the y -axis.

- a) $8\pi/15$
- b) $16\pi/15$
- c) $32\pi/15$
- d) $64\pi/15$

22) Find the equation of the line tangent to the curve $y = \sin(x)$ at the point $(\pi/2, 1)$.

- a) $y = x - \pi/2 + 1$
- b) $y = -x + \pi/2 + 1$
- c) $y = -x + \pi/2 - 1$
- d) $y = x - \pi/2 - 1$

23) What is the definition of a derivative in calculus?

- a) The slope of a curve at a point
- b) The area under a curve
- c) The limit of the difference quotient as the change in x approaches zero
- d) The integral of a function

24) What is the fundamental theorem of calculus?

- a) The derivative of the integral of a function is equal to the function

- b) The integral of a function is equal to the area under the curve
- c) The derivative of a function is equal to the slope of the tangent line at a point
- d) The integral of a function is equal to the sum of its values over a given interval

25) What is the difference between a local maximum and a global maximum of a function?

- a) A local maximum is the highest point of a function on a particular interval, while a global maximum is the highest point of the whole function.
- b) A local maximum is the highest point of a function, while a global maximum is the lowest point of a function.
- c) A local maximum is the highest point of a function on a particular interval, while a global maximum is the highest point of the function on its entire domain.
- d) A local maximum is the highest point of a function on its entire domain, while a global maximum is the highest point of the function on a particular interval.

26) What is the difference between a convergent and a divergent infinite series?

- a) A convergent series has a sum that approaches a finite value, while a divergent series has a sum that approaches infinity or does not exist.
- b) A convergent series has a sum that approaches infinity, while a divergent series has a sum that approaches a finite value.
- c) A convergent series has a sum that approaches zero, while a divergent series has a non-zero sum.
- d) A convergent series has a non-zero sum, while a divergent series has a sum that approaches zero.

27) What is the definition of a complex number?

- a) A number that can be expressed as the ratio of two integers
- b) A number that can be expressed as a ratio of two polynomials
- c) A number that has both a real and an imaginary part
- d) A number that has only an imaginary part.

28) Find the solution to the differential equation $y' + y = 0$ with initial condition $y(0) = 2$.

- a) $y = 2e^{-x}$
- b) $y = 2e^x$
- c) $y = 2/(1 + e^x)$
- d) $y = 2/(1 - e^x)$

29) What is the limit of $f(x) = (\sin(x) - x)/(x^3 - 1)$ as x approaches 0?

- a) 0
- b) $1/6$
- c) $1/3$
- d) Does not exist

30) Find the value of the integral $\int (x^2 + 3x - 1)dx$ from $x = 1$ to $x = 4$.

- a) 54
- b) $61/3$
- c) $63/3$
- d) $64/3$

31) Find the equation of the normal line to the curve $y = 2x^3 - x^2 + 3x - 2$ at the point (1, 3).

- a) $y = -1/5x + 16/5$
- b) $y = -5x + 16$
- c) $y = 1/5x + 14/5$
- d) $y = 5x + 14$

32) Find the value of the derivative of $f(x) = e^{(2x)} + \ln(x^2 + 1)$ with respect to x .

- a) $2e^{(2x)} + 2x/(x^2 + 1)$
- b) $2e^{(2x)} + 2x$
- c) $e^{(2x)} + 2x/(x^2 + 1)$
- d) $e^{(2x)} + 2x$

33) Find the solution to the differential equation $y'' - 2y' + y = e^x$.

- a) $y = (x + 1)e^x$
- b) $y = (x - 1)e^x$
- c) $y = (x + 1)e^{(2x)}$
- d) $y = (x - 1)e^{(2x)}$

34) Find the value of the integral $\int (1/x + \ln(x))dx$ from $x = 1$ to $x = e$.

- a) 1
- b) e
- c) $e + 1$
- d) e^2

35) Find the equation of the line perpendicular to the line $y = 2x + 1$ and passing through the point (3, 5).

- a) $y = -1/2x + 7/2$
- b) $y = -2x + 11$
- c) $y = 1/2x + 7/2$
- d) $y = 2x - 1$

36) Find the area of the region bounded by the curves $y = x^2 - 4x + 3$ and $y = 3 - x$.

- a) $8/3$
- b) $10/3$
- c) $12/3$
- d) $14/3$

37) What is the difference between a line segment and a ray?

- a) A line segment has a finite length, while a ray extends infinitely in one direction.
- b) A line segment extends infinitely in one direction, while a ray has a finite length.
- c) A line segment and a ray are the same thing.
- d) A line segment extends infinitely in two directions.

38) What is the definition of a function?

- a) A set of ordered pairs where each input is paired with exactly one output.
- b) A set of ordered pairs where each output is paired with exactly one input.
- c) A set of ordered pairs where each input is paired with more than one output.
- d) None

39) What is the Pythagorean theorem?

- a) $a^2 + b^2 = c^2$, where a, b, and c are the sides of a right triangle.
- b) $a + b = c$, where a, b, and c are the sides of a right triangle.
- c) $a^2 - b^2 = c^2$, where a, b, and c are the sides of a right triangle.
- d) $a^2 = c^2 + a^2$, where a, b, and c are the sides of a right triangle.

40) What is the definition of a logarithm?

- a) The inverse operation of exponentiation, used to solve equations where the unknown variable is in the exponent.
- b) A function that describes the rate of change of a quantity over time.
- c) A type of mathematical function that involves the use of imaginary numbers.
- d) A geometric figure that has four sides and four right angles.