

MIDTERM EXAMINATION
MTH101- Calculus And Analytical Geometry

Time: 60 min
Marks: 40

Question No: 1 (Marks: 1) - Please choose one

$$30^0 = \underline{\hspace{2cm}}$$

▶ $\frac{\pi}{3}$

▶ $\frac{\pi}{4}$

▶ $\frac{\pi}{6}$

▶ $\frac{\pi}{2}$

Question No: 2 (Marks: 1) - Please choose one

Let a function f be defined on an interval, and let x_1 and x_2 denotes two distinct points in that interval. If $f(x_1) = f(x_2)$ for all points x_1 and x_2 then which of the following statement is correct?

- ▶ f is a decreasing function
- ▶ f is an increasing function
- ▶ f is a constant function

Question No: 3 (Marks: 1) - Please choose one

Tan(x) is continuous every where except at points

- ☐ $\pm \frac{k\pi}{2} (k = 1, 3, 5, \dots)$
- ☐ $\pm \frac{k\pi}{2} (k = 2, 4, 6, \dots)$
- ☐ $\pm \frac{k\pi}{2} (k = 1, 2, 3, 4, 5, 6, \dots)$
- ☐

Question No: 4 (Marks: 1) - Please choose one

$$\lim_{x \rightarrow \infty} (-2x) =$$

- ☐ -2
- ☐ 0
- ☐ 2
- ☐ Does not exist

Question No: 5 (Marks: 1) - Please choose one

Suppose that f and g are differentiable functions of x then

$$\frac{d}{dx}[f][g] =$$

- ☐ $\frac{[f'] [g] - [f] [g']}{g^2}$
- ☐ $[f'] [g']$
- ☐ $[f'] [g] + [f] [g']$
- ☐ $[f'] [g] - [f] [g']$

Question No: 6 (Marks: 1) - Please choose one

The solution set of the inequality $|x+4| \geq 2$ is

- ▶ $(-\infty, -6] \cup [2, +\infty)$
- ▶ None of these
- ▶ $(-\infty, 6] \cup [-2, +\infty)$
- ▶ $(-\infty, -6] \cup [-2, +\infty)$

Question No: 7 (Marks: 1) - Please choose one

A line is called a tangent line to the circle if it meets the circle at precisely

- ▶ One point
- ▶ Two points
- ▶ Infinite points

Question No: 8 (Marks: 1) - Please choose one

Let a function f be defined on an interval, and let x_1 and x_2 denote points in that interval. If $f(x_1) < f(x_2)$ whenever $x_1 < x_2$ then which of the following statement is correct?

- ▶ f is an increasing function.
- ▶ f is a decreasing function.
- ▶ f is a constant function.

Question No: 9 (Marks: 1) - Please choose one

If $f(x) = 3x^8 + 2x + 1$ then $f'(x) =$ _____

- ▶ $3x^7 + 2$
- ▶ $24x^7 + 2$
- ▶ $3x^9 + 2x^2$
- ▶ $24x^9 + 2x^2$

Question No: 10 (Marks: 1) - Please choose one

π is anumber

- ▶ Integer
- ▶ Rational
- ▶ Irrational
- ▶ Natural

Question No: 11 (Marks: 1) - Please choose one

The set $\{x: a \leq x \leq b\}$ can be written in the form of interval

- ▶ (a,b)
- ▶ (a,b]
- ▶ [a,b]

Question No: 12 (Marks: 1) - Please choose one

Suppose that f and g are differentiable functions of x then

$$\frac{d}{dx} \left[\frac{f}{g} \right] =$$

- ▶ $\frac{[g][f'] - [f][g']}{g^2}$
- ▶ $\frac{[g'][f] - [f'][g]}{g^2}$
- ▶ $\frac{[g][f'] - [f][g']}{f^2}$
- ▶ $\frac{[g'][f] - [f'][g]}{f^2}$

Question No: 13 (Marks: 1) - Please choose one

The graph $x = y^2$ is symmetric about -----axis

- ▶ X-axis
- ▶ Y-axis
- ▶ Origin

Question No: 14 (Marks: 1) - Please choose one

$$\lim_{x \rightarrow -7} \frac{x^2 - 49}{x + 7}$$

- ▶ -14
- ▶ 0
- ▶ ∞
- ▶ Limit does not exist

Question No: 15 (Marks: 1) - Please choose one

Chain rule is a rule for differentiating _____ of functions.

- ▶ Product
- ▶ Sum
- ▶ Difference
- ▶ Composition

Question No: 16 (Marks: 1) - Please choose one

$$\lim_{x \rightarrow a} f(x) = \dots\dots\dots \text{where } f(x) = k$$

The _____ (k is a constant)

- ▶ k+2
- ▶ k+1
- ▶ k

Question No: 17 (Marks: 1) - Please choose one

For any number $\varepsilon > 0$ if we can find an open interval (x_0, x_1) on the x-axis containing the point "a" such that $L - \varepsilon < f(x) < L + \varepsilon$ for each x in (x_0, x_1) except the possible x = a then we say $\lim_{x \rightarrow a} f(x) =$ _____

- ▶ L
- ▶ $L - \varepsilon$
- ▶ $L + \varepsilon$
- ▶ L+1

Question No: 18 (Marks: 1) - Please choose one

If $2x - y = -3$ then $\frac{dy}{dx} =$

- ▶ 2
- ▶ -2
- ▶ 0

► -3

Question No: 19 (Marks: 1) - Please choose one

The graph of the equation $y = x^2 - 4x + 5$ will represent

- Parabola
- Straight line
- Two straight lines

- Ellipse

Question No: 20 (Marks: 1) - Please choose one

The equation of line of the form $y - y_1 = m(x - x_1)$ is known as

- Point-slope form
- Two points form
- Intercepts form
- Slope intercept form

Question No: 21 (Marks: 2)

If $y = 5 \cos(x^2 + 1)$
Find dy/dx by using "The chain rule".

Question No: 22 (Marks: 2)

Prove that $\lim_{x \rightarrow 1} (x + 5) = 6$, using the definition of limit.

Question No: 23 (Marks: 3)

Find an equation of the tangent line to the curve

$$y = \frac{2}{x^2 + x}$$

at the point where $x = 1$

Question No: 24 (Marks: 3)

$$\lim_{x \rightarrow 0} \frac{\sin(5x)}{3x}$$

Compute

Question No: 25 (Marks: 5)

$$f(x) = x^4 - 4x^3 + 4x^2$$

Find all critical points of

Question No: 26 (Marks: 5)

$$\frac{dy}{dx} \quad y = x^2 (\cot x) - \frac{1}{x^2}$$

Find if