

MIDTERM EXAMINATION

MTH101- Calculus And Analytical Geometry

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

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The average velocity of a body is  $V_{ave}$

☐  $\frac{d_1 - d_0}{t_1 - t_0}$

☐  $\frac{t_1 - t_0}{f(t_0) - f(t_1)}$



☐  $\lim_{t_1 \rightarrow t_0} \frac{f(t_0) - f(t_1)}{t_1 - t_0}$



☐ None of these

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

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Consider two function  $f(x) = x^3$  and  $g(x) = (x+9)$  then  $f \circ g(x) =$

☐  $(x+9)^3$

☐  $x+3$

☐  $x+9$

☐ None of these

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

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Consider two function  $f(x) = x^2$  and  $g(x) = \sqrt{x}$  then  $f \circ g(x) =$  .....

☒  $x$  -correct

☐  $x^2$

☐  $\sqrt{x}$

☐ None of these

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

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Consider two function  $f(x) = 3\sqrt{x}$  and  $g(x) = \sqrt{x}$  what is true about these functions

▶  $f(x).g(x) = 3x$

$f(x)/g(x) = 3x$

▶

▶  $f(g(x)) = 3x$

▶

▶ None of these -correct

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

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The centre and the radius of the circle  $(x+5)^2 + (y-3)^2 = 16$  is

▶  $(-5,3), 4$

▶  $(5,-3), 16$

▶  $(5,-3), 4$

▶ None of these

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

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

▶ X-axis

▶ Y-axis

▶ Origin

▶ None of these

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

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The chain rule is used for two function f and g , if we have ----- of these function

▶ Product

▶ Sum

▶ Composition

▶ None of these

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

A function  $f$  is differentiable function if it is differentiable on the interval

- ▶  $(-\infty, \infty)$
- ▶  $(a, \infty)$  where  $a$  is any negative integer
- ▶  $(0, \infty)$
- ▶ None of these

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

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A function is said to be continuous function if the function is continuous on the interval

- ▶  $(-\infty, +\infty)$
- ▶  $(0, +\infty)$
- ▶  $(-\infty, 0)$
- ▶ None of these

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

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$$\lim_{x \rightarrow 0} \frac{\sin x}{x}$$

- ▶ 1
- ▶ 2
- ▶ 0-correct
- ▶  $1/2$

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

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For any polynomial  $P(x) = c_0 + c_1x + \dots + c_nx^n$  and any real number  $a$   
 $\lim_{x \rightarrow a} P(x) = c_0 + c_1a + \dots + c_na^n =$

- ▶  $P(a)$  -correct

▶  $P(a+1)$

▶  $P(a-1)$

▶  $\frac{1}{P(a)}$

▶

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

The no of x and y intercepts for the equation  $y=1/x$

▶ Two x intercepts

▶ Two y intercepts

▶ No x and no y intercepts-correct

▶ None of these

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

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

.....

▶ One point -correct

▶ Two points

▶ Infinite points

▶ None of these

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

If  $f$  is a twice differentiable function at a stationary point  $x_0$  and  $f''(x_0) < 0$   
then  $f$  has relative ..... At  $x_0$

▶ Minima -correct

▶ Maxima

▶ None of these

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

If the  $\lim_{x \rightarrow a} f(x) = L$  then the inequality  $(L - \varepsilon) < f(x) < L + \varepsilon$  holds in any  
subset of the interval

▶  $(a - \delta, a) \cup (a, a + \delta)$

▶  $(a - 1, a) \cup (a, a + 1)$

▶

- ▶  $(a - \varepsilon, a) \cup (a, a + \varepsilon)$
- ▶ None of these

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

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$$\lim_{x \rightarrow 5} \frac{\sqrt{x+4}}{x^2+2} =$$

- ▶ 0
- ▶  $\infty$
- ▶  $1/9$
- ▶ Limit doesn't exist

**Question No: 17 ( Marks: 2 )**

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$$f(x) = x^2 - 3x + 1$$

Show that \_\_\_\_\_ is a continuous function.

$$\lim_{x \rightarrow +\infty} (x^2 - 3x + 1) = +\infty$$

And

$$\lim_{x \rightarrow +\infty} (x^2 - 3x + 1) = +\infty$$

**Question No: 18 ( Marks: 2 )**

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Find the range of function  $f$  defined by  $f(x) = x^2 + 5$

**Question No: 19 ( Marks: 3 )**

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$$y = (\cos x)^{6x}$$

Differentiate:

**Question No: 20 ( Marks: 5 )**

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Differentiate w.r.t. x by chain rule  $y = \cos^2(x^3)$

**Question No: 21 ( Marks: 10 )**

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Evaluate the following limit.

$$\lim_{x \rightarrow 2} \frac{x^2 + 4x - 12}{x^2 - 2x}$$