**MIDTERM EXAMINATION**
**Fall 2009**
**MTH101- Calculus And Analytical Geometry**

**Time: 60 min**
**Marks: 42**

# Calculus & Analytical Geometry-I

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

The base of the natural logarithm is

► 2.71

► 10

► 5

► None of these

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

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A line $x = x_0$ is called ---------- for the graph of a function $f$ if $f(x) \to +\infty \; or \; f(x) \to -\infty$ as $x$ approaches $x_0$ from the right or from the left

► Horizontal asymptotes

► None of these

► Vertical asymptotes

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

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If a function satisfies the conditions

f(c) is defined

$\lim_{x \to c^+} f(x)$ Exists

$\lim_{x \to c^+} f(x) = f(c)$

Then the function is said to be

► Continuous at c

► Continuous from left at c

► Continuous from right at c

► None of these

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

If $f''(x) < 0$ on an open interval (a,b) then f is ---------- on (a,b )

- ► None of these
- ► Concave up
- ► Concave down
- ► Closed

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

Suppose that $f \text{ and } g$ are differentiable function of x then $\frac{d}{dx}(\frac{f}{g})$

- ► $\frac{g.f' - f.g'}{g^2}$
- ► $\frac{g.f' + f.g'}{g^2}$
- ► $\frac{g.f' - f.g'}{g}$
- ►
- ► None of these

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

A line $x = x_0$ is called ---------- for the graph of a function $f$ if $f(x) \to +\infty \text{ or } f(x) \to -\infty$ as $x$ approaches $x_0$ from the right or from the left

- ► Horizontal asymptotes
- ► None of these
- ► Vertical asymptotes

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

If $y = \frac{1}{1-x}$ then $\frac{dy}{dx} =$

- ► 1
- ► -1
- ► $\frac{1}{(1-x)^2}$
- ► $\frac{-1}{(1-x)^2}$

**Question No: 8 ( 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: 9 ( Marks: 1 ) - Please choose one**

If $x^2 + y^2 = 9$ then $\frac{dy}{dx} =$

- $\frac{x}{y}$
- $\frac{-x}{y}$
- $\frac{-y}{x}$
- $\frac{y}{x}$

**Question No: 10 ( 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
- Maxima
- None of these

**Question No: 11 ( 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
- Maxima
- None of these

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

If

$f''(x) > 0$ on an open interval (a,b), then which of the following statement is correct?

► $f$ is concave up on (a, b).

► $f$ is concave down on (a, b).

► $f$ is linear on (a, b).

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

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Let $y = (x^3 + 2x)^{37}$. Which of the following is correct?

► $\frac{dy}{dx} = (37)(x^3 + 2x)^{36}$

► $\frac{dy}{dx} = 111x^2(x^3 + 2x)^{36}$

► $\frac{dy}{dx} = (111x^2 + 74)(x^3 + 2x)^{36}$

► $\frac{dy}{dx} = (111x^2 + 74)(x^3 + 2x)^{38}$

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

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$If\ x > 0\ then\ \frac{d}{dx}[\ln x] =$ _____

► 1

► $x$

► $\frac{1}{x}$

► $\ln \frac{1}{x}$

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

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$\log_b ac =$ _____

► $\log_b a + \log_b c$

► $\log_a b + \log_c b$

► $\log_{a+c} b$

► None of these

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

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$\log_b \frac{1}{c} =$ _____

- $\log_b c$
- $1 - \log_b c$
- $-\log_b c$
- $1 + \log_b c$

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

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$\log_b \frac{1}{t} =$ _____

- $\log_b t$
- $1 - \log_b t$
- $1 + \log_b t$
- $-\log_b t$

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

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If we have $x^2 + y^2 = 1$ then $\frac{dy}{dx} =$ _____

- $\frac{-x}{y}$
- $\frac{x}{y}$
- $\frac{-y}{x}$
- None of these

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

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$\log_b a^r =$ _____

- $a \log_b r$
- $r \log_b a$
- $\frac{\log_b a}{\log_b r}$
- 
- $\log_b a + \log_b r$

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

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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: 21 ( Marks: 1 ) - Please choose one**

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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: 22 ( Marks: 5 )**

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Differentiate w.r.t. $x$ by chain rule $y = \sqrt{x^2 + 1}$