MIDTERM EXAMINATION
Fall 2009
MTH101- Calculus And Analytical Geometry

Time: 60 min
Marks: 42

Calculus & Analytical Geometry-I

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

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

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 $\frac{d}{dx}\left(\frac{f}{g}\right)$

- ► $\frac{g.f' - f.g'}{g^2}$
- ► $\frac{g.f' + f.g'}{g^2}$
- ► $\frac{g.f' - f.g'}{g}$
- ► 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

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

- $[f'][g]-[f][g']$
- 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 $\frac{dy}{dx} =$

- x
- y
- $-x$
- y
- $-y$
- x
- 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

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

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

$\log_b ac =$ – – – – – –

- ► $\log_b a + \log_b c$
- ► $\log_a b + \log_c b$
- ► $\log_{a+c} b$
- ► None of these

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

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

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

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

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

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

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

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

$\log_b a^r$ = _____

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

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

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

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)

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