MIDTERM EXAMINATION
Spring 2009
MTH101- Calculus And Analytical Geometry (Session - 6)
Time: 60 min
Marks: 40

Calculus & Analytical Geometry-I

Gulshan Ali (Hafizabad)
gulshanvu@yahoo.com

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

The set {…,-4,-3,-2,-1,0,1,2,3,4,..} is know as set of .....

- ► Natural numbers
- ► Integers
- ► Whole numbers
- ► None of these

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

The domain of the function $h(x)=\frac{1}{(x-2)(x-4)}$ is

- ► $(-\infty,2)\cup(2,4)\cup(4,+\infty)$
- ► $(-\infty,2\}\cup\{2,4\}\cup\{4,\infty)$
- ► $(-\infty,2.5)\cup(2.5,4.5)\cup(4.5,\infty)$
- ► All of these are incorrect

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

If the $\lim_{x \to a} f(x) = L$ 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: 4 (Marks: 1) - Please choose one

$L-\varepsilon < f(x) < L+\varepsilon$ Can be written as

- ▶ $|f(x)-L| < \varepsilon$
- ▶ $|f(x)-L| > \varepsilon$
- ▶ $|f(x)-L| < \varepsilon+1$
- ▶ None of these

Question No: 5 (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: 6 (Marks: 1) - Please choose one

$\frac{d}{dx}[sex] = -----$

► $\frac{\sin x}{1-\sin^2 x}$

► $\frac{-\sin x}{1-\sin^2 x}$

► $\frac{1}{1-\sin^2 x}$

► None of these

Question No: 7 (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: 8 (Marks: 1) - Please choose one

$\log_b a^r = ------$

► $a \log_b r$

► $r \log_b a$

► $b\log_a r$

► None of these

Question No: 9 (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: 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

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

► One point
► Two points
► Infinite points
► None of these

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

The equation $(x+4)^2 + (y-1)^2 = 6$ represents a circle having center at ..... and radius .....

► $(-4,1), \sqrt{6}$

► $(-4,1), 6$

- ▶ $(-4,-1),\sqrt{6}$
- ▶ None of these

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

The $\lim_{x\to a} f(x)\ where\ f(x)=k$ (k is a constant) is equal to

- ▶ k+2
- ▶ k+1
- ▶ k
- ▶ kf

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

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

- ▶ $P(a)$
- ▶ $P(a+1)$
- ▶ $P(a-1)$
- ▶ $\frac{1}{P(a)}$

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

Polynomials are always ..... Function

- ▶ Continuous
- ▶ Discontinuous

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

$\frac{D}{Dx}[dh(x)]=$ ----

where d is a constant

- ▶ $dh(x)$
- ▶ $dh'(x)$
- ▶ 0
- ▶ None of these

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

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

- ▶ X-axis
- ▶ Y-axis
- ▶ Origin
- ▶ None of these

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

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

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

The formula $\lim_{h\to 0} \frac{f(x+h)-f(x)}{h}$ is called ..... with respect to x of the function f

- ▶ Derivative
- ▶ Slope
- ▶ Tangent
- ▶ None of these

Question No: 20 (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: 21 (Marks: 2)

If $\frac{dy}{dx}=-\frac{3yx^2+1}{28y^3+x^3}$

then find the slope of the tangent line at the point (2, 0).

Question No: 22 (Marks: 3)

$$Let \quad f(x)=\begin{cases}\frac{x^2-x-2}{x+1} & if \quad x\neq -1\\ -3 & if \quad x=-1\end{cases}$$

At what points the function f is continuous and discontinuous? At point of discontinuity if any explain why it is discontinuous?

Question No: 23 (Marks: 5)

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

Question No: 24 (Marks: 10)

Evaluate the following limit.

$$\lim_{y \to -2} g(y) \quad where, \; g(y) = \begin{cases} y^2 + 5 & if \quad y < -2 \\ 3 - 3y & if \quad y \geq -2 \end{cases}$$