KINGDOM OF SAUDI ARABIA
MINISTRY OF EDUCATION
JAZAN UNIVERSITY
Department of Mathematics

Calculus 1(Math 105)
Date: 22-10-2024
Max. Marks: 20
Time: 12-1 PM (I hour)

MID-TERM EXAM, SEMESTER-1 (2024-25)

Name: **University ID:** **Group Number:**

Room Number: **Serial number:**

Note: Calculator is not allowed

Q.I: Choose the correct answer from the following questions: **(CLOs: K1: 1-3, K2: 4-6, K3: 7-8)**

(1) **The domain of the function** $f(x) = \frac{3}{\sqrt{x}}$ is

a) $(-\infty, \infty)$ b) $[0, \infty)$ c) $(0, \infty)$ d) none

(2) **If** $F(x) = fog = (x^2 + 1)^{10}$**, then**

a) $f(x) = x^{10}$ *and* $g(x) = x^2 + 1$ b) $f(x) = x^2 + 1$ *and* $g(x) = x^{10}$

c) $f(x) = x^{10}$ *and* $g(x) = (x + 1)^2$ d) *none*

(3) **Which of the following function is odd?**

a) $f(x) = x - 1$ b) $f(x) = x\,cosx$ c) $f(x) = x^2$ d) none

(4) **If** $\cos\theta = \frac{\sqrt{3}}{2}$, $0 < \theta < \frac{\pi}{2}$ **, then the value of** $\sin\theta$ **is**

a) $\frac{3}{4}$ b) $\frac{1}{2}$ c) 1 d) none

(5) **Which of the following function is not one-to-one?**

a) $f(x)=x+4$ b) $f(x) = x^2$ c) $f(x) = x^3$ d) none

(6) **The vertical asymptote of the curve** $y = \frac{x}{x-2}$ **is**

a) $x = 2$ b) $x = -2$ c) $x = 3$ d) none

(7) $\lim_{x\to -2} (x^2 - 2x - 12) =$

a) 0 b) 10 c) -12 d) none

(8) $\lim_{x\to 2} \lfloor x \rfloor =$

a) 1 b) 2 c) 3 d) does not exist

Answers:

1	2	3	4	5	6	7	8
c	a	b	b	b	a	d	d

Q II. Solve the following questions **(CLOs: S1, S2, S3, S4: $4 \times 3 = 12$ Marks)**

1. Find the inverse of $f(x) = \sqrt{10 - 3x}$

Sol: $f(x) = y = \sqrt{10 - 3x}$

Solving for x: $x = \frac{10-y^2}{3} \Rightarrow f^{-1}(y) = \frac{10-y^2}{3}$

Interchanging x and y, we find $f^{-1}(x) = \frac{10-x^2}{3}$

2. Find the exact value of the expression $\log_3 \sqrt{3} + \log_3 \sqrt{6} - \log_3 \sqrt{2}$

Sol: $\log_3 \sqrt{3} + \log_3 \sqrt{6} - \log_3 \sqrt{2} = \log_3(\sqrt{3} \cdot \sqrt{6}) - \log_3 \sqrt{2} = \left(\frac{\sqrt{3} \cdot \sqrt{6}}{\sqrt{2}}\right) = \log_3 3 = 1$

3. Find $\lim\limits_{x \to 2} \frac{x^2+x-6}{x-2}$

Sol: $\lim\limits_{x \to 2} \frac{x^2+x-6}{x-2} = \lim\limits_{x \to 2} \frac{(x-2)(x+3)}{x-2} = \lim\limits_{x \to 2} (x+3) = 2 + 3 = 5$

4. Find $\lim\limits_{x \to 1} arc \sin\left(\frac{1-\sqrt{x}}{1-x}\right)$

Sol:

$$\lim_{x \to 1} arc \sin\left(\frac{1-\sqrt{x}}{1-x}\right) = \lim_{x \to 1} arc \sin\left(\frac{1-\sqrt{x}}{(1-\sqrt{x})(1+\sqrt{x})}\right) = \lim_{x \to 1} arc \sin\left(\frac{1}{(1+\sqrt{x})}\right) = arc \sin\left(\frac{1}{2}\right) = \frac{\pi}{6}$$