

**King Fahd University of Petroleum & Minerals**  
**Department of Mathematics & Statistics**  
**\*MATH 132 (073)**  
**Exam 1**

**Time: 75 Minutes**

Marks: 60

Name: \_\_\_\_\_ ID: \_\_\_\_\_ Section: 1, 2

Serial: \_\_\_\_\_

**No Calculator is allowed in the Exam**

Marks obtained in

Part A:        /30

Part B:        /30

Total:        /60

**Instructor: M. A. Bokhari**

**Part A: Show your work and encircle Only one answer (No point for showing no work**

Q1.  $\lim_{x \rightarrow \infty} \frac{x^2 - 1}{(2 - 3x)^2}$

- a)  $\frac{1}{3}$    b)  $\frac{1}{9}$    c)  $\infty$    d)  $\frac{-1}{9}$    e)  $\frac{-1}{2}$

Q2.  $\lim_{x \rightarrow -4} \frac{x^3 + 4x^2}{x^2 + 2x - 8}$

- a)  $\frac{-4}{3}$    b)  $\frac{16}{3}$    c) 0   d)  $\frac{18}{5}$    e)  $\frac{-8}{3}$

Q3.  $\lim_{x \rightarrow \infty} \frac{4x^2 - x^4}{31x - 2x^3}$

- a)  $\frac{4}{31}$    b)  $\frac{1}{2}$    c)  $\infty$    d)  $-\infty$    e)  $\frac{-1}{2}$

Q4. The rate of change of  $y = \frac{(x-1)^5}{x}$  with respect to  $x$  at  $x = 2$  is

- a) 18   b)  $\frac{11}{3}$    c)  $\frac{9}{4}$    d)  $\frac{25}{2}$    e)  $\frac{7}{4}$

Q5. The slope of tangent line to the curve  $y = \sqrt[3]{(11-3x^2)^2}$  with respect to  $x$  at  $x = 2$  is

- a) 8   b)  $\frac{8}{3}$    c) -2   d)  $\frac{25}{2}$    e)  $\frac{5}{4}$

Q6. The derivative of  $y = \ln(x + \sqrt{1+x^2})$  with respect to  $x$  at  $x = 0$  is

- a) 5   b) 0   c) 2   d)  $\frac{25}{2}$    e) 1

**Part B: Show all steps while solving the following problems.**

Q7. Evaluate showing.  $\lim_{x \rightarrow 4^+} \frac{\sqrt{x^2 - 16}}{4 - x}$ . **(6 pts)**

Q8. (Give reason for your answer): Check the continuity of  $f(x) = \begin{cases} x^2 - 1 & \text{if } x > -2 \\ 3 & \text{if } x = -2 \\ \frac{1}{x - 1} & \text{if } x < -2 \end{cases}$

(i) at  $x = -2$  **(3 pts)**

(ii) at  $x = 1$  **(3 pts)**

Q9. Evaluate  $\lim_{w \rightarrow 0} \frac{f(2+w) - f(2)}{w}$  for  $f(x) = \frac{1}{1-2x}$ . **(7 pts)**

Q10. The total cost to manufacture  $q$  units of a product in Saudi Riyals is given by

$$c = \frac{2}{q} + q + 15.$$

(a) Find the marginal cost when 8 units are produced per day. **(2 pts)**

(b) Find the percentage marginal cost when  $q = 8$ . **(3 pts)**

(c) Using derivative, approximate the exact change in cost when production is increased from 8 units to 8.01 units. **(3 pts)**

(d) Find  $\frac{\Delta c}{\Delta q}$  when  $q \in [2, 8]$  **(3 pts)**