

Question 4:

(9 Marks)

Evaluate each of the following limits (if exist).

1) $\lim_{x \rightarrow 0} \frac{x+8}{x^2+2}$

2) $\lim_{x \rightarrow 0} \frac{\sin(5x) + \tan(3x)}{2x}$

3) $\lim_{x \rightarrow 4} \frac{x-4}{\sqrt{x}-2}$

4) $\lim_{x \rightarrow 2} \frac{x^2-4}{x^2-3x+2}$

5) $\lim_{x \rightarrow 0} x^2 \cos\left(\frac{3}{x}\right)$

6) $\lim_{x \rightarrow \infty} \cos\left(\frac{\pi x + 1}{x^2 + 3}\right)$

Question 6:

(6 Marks)

A) Let $f(x) = x^2 + 3$, then use the definition of derivative to find $f'(x)$

B) Find all vertical and horizontal asymptotes (if any) for $f(x) = \frac{\sqrt{9x^2+13}}{2x-3}$

C) Find the values of a and b such that the function $g(x) = \begin{cases} \frac{x^2+bx+5}{x-1} & , x \neq 1 \\ a & , x = 1 \end{cases}$

is continuous at every real number.

Good Luck

Page 2 of 2



KING SAUD UNIVERSITY
COMMON FIRST YEAR
BASIC SCIENCES DEPARTMENT
Math 101 Mid term Exam 1438/1439 H.
First Semester
Time Allowed - 2 Hours

St. Name: _____ St. ID: _____ Section: _____

ملاحظة: اكتب خطوات الحل بالتفصيل لجميع الأسئلة داخل دفتر الإجابة (الإجابة على ورقة الأسئلة غير معتمدة).
علماً بأن عدد الأسئلة (٥). وعدد الصفحات (٧).

Question 1: (4 Marks)

A) Solve the following inequality, and write your answer in interval notation

$$-5 < 2x - 3 \leq 7$$

B) Determine algebraically is the function $f(x) = \frac{x^6 + x^8}{|x|}$ even, odd, or neither.

Question 2: (7 Marks)

A) Let $f(x) = \frac{7}{4 - x^2}$, $g(x) = \sqrt{x}$. Find:

1) $(f \circ g)(x)$.

2) D_f , D_g , and $D_{f \circ g}$.

B) Given that $f(x) = \frac{1 - 2x}{3x + 2}$ is a one-to-one function, find $f^{-1}(x)$.

C) If $3 \sec \theta + 5 = 0$, $\sin \theta > 0$, then find $\sin(2\theta)$.

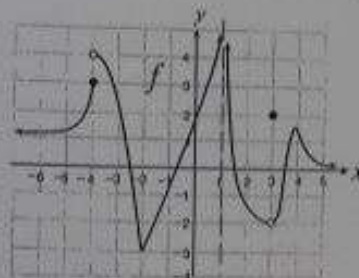
Question 3: (4 Marks)

Use the graph of $y = f(x)$ to find the following:

a) $\lim_{x \rightarrow 2} f(x)$

b) The horizontal and vertical asymptote(s) for the graph of $f(x)$.

c) The x -value(s) in the domain at which $f(x)$ is not differentiable.



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