Question 4: **(9 Marks)**

Evaluate each of the following limits (if exist).

1) $\lim_{x \to 0} \dfrac{x + 8}{x^2 + 2}$

2) $\lim_{x \to 0} \dfrac{\sin(5x) + \tan(3x)}{2x}$

3) $\lim_{x \to 4} \dfrac{x - 4}{\sqrt{x} - 2}$

4) $\lim_{x \to 2} \dfrac{x^2 - 4}{x^2 - 3x + 2}$

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

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

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 $f(x) = \dfrac{\sqrt{9x^2 + 13}}{2x - 3}$

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

is continuous at every real number.

Good Luck

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).
علمًا بأن عدد الأسئلة (٥)، وعدد الصفحات (٢).

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 $f(x) = \dfrac{x^4 + x^3}{|x|}$ even, odd, or neither.

Question 2: **(7 Marks)**

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

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

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

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

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

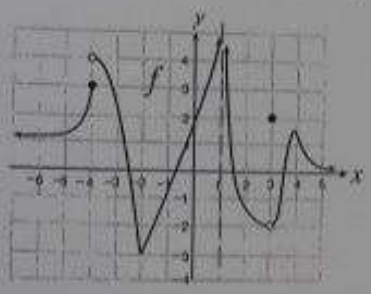
Question 3: **(4 Marks)**

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

a) $\lim\limits_{x \to 3} f(x)$

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.



يتبع P2