Ministry of Education **Al-Imam Mohammad Ibn Saud Islamic** University College of Science

Department of Mathematics and Statistics



Midterm 1

Course Name: Calculus I Course Code: MAT 101

Semester/Year: Second/1436-1437 **Date/Time:** 21-5-1437 / 4:00 pm

Duration: 75 min's

Instructions: Only ordinary calculators are allowed.

Question 1. [10 marks] Evaluate the following limits:

(i)
$$\lim_{x \to 0} \frac{x}{\sqrt{x+3} - \sqrt{3}}$$
(ii)
$$\lim_{x \to 2} \frac{|x-2|}{x-2}$$
(iii)
$$\lim_{x \to \infty} \frac{-x}{\sqrt{x^2+1}}$$
(v)
$$\lim_{x \to 0} \frac{\sin 2x \cdot \cos 3x}{x}$$

$$(ii)\lim_{x\to 2}\frac{\left|x-2\right|}{x-2}$$

(iii)
$$\lim_{x \to -\infty} \frac{-x}{\sqrt{x^2 + 1}}$$

$$(iv)\lim_{x\to\infty}\frac{\cos x}{x^2}$$

$$(v) \qquad \lim_{x \to 0} \frac{\sin 2x \cdot \cos 3x}{x}$$

Question 2. [3 marks] Find the values of a and b in order to the following function be continuous:

$$f(x) = \begin{cases} \frac{2\sin(3x)}{x}, & if & x < 0\\ b+1, & if & x = 0.\\ a\cos(2x) - 1, & if & x > 0 \end{cases}$$

Question 3. [3 marks] Find the vertical and horizontal asymptotes for:

$$f(x) = \frac{4 - x^2}{x^2 - 9}.$$

Question 4. [4 marks]

- (a) Use the formal definition of the limit to prove that $\lim_{x\to 1} (5x-1) = 4$.
- (b) Use the definition of the derivative to find f'(x) if $f(x) = x^2 + 3$.

End Questions & Good Luck)