

Kingdom of Saudi Arabia
Ministry of higher Education
Al-Imam Mohammad Ibn Saud
Islamic University

College of Science

Department of Mathematics and Statistics

Academic year: 2015 - 2016
First Semester



MIDTERM I

المملكة العربية السعودية
وزارة التعليم العالي
جامعة الإمام محمد بن سعود
الإسلامية

كلية العلوم

قسم الرياضيات والإحصاء

العام الدراسي: ١٤٣٦ - ١٤٣٧
الفصل الأول

Course name: Calculus I
Course code: Mat ١13
Duration: 1 hours

	Name الاسم
	Student ID الرقم الجامعي
	Section الشعبة
	Class time وقت المحاضرة
	Class instructor أستاذ الشعبة

Question 1) (6 points)

Compute the following limits:

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

b) $\lim_{x \rightarrow 2} \frac{\sqrt{x^2 + 5} - 3}{x - 2}$

c) $\lim_{x \rightarrow 0} \frac{x^2}{\sin x}$

d) $\lim_{x \rightarrow \infty} e^{-x^2}$

Question 2) (4 points)

(a) Consider the following function:

$$f(x) = \begin{cases} 3 & : x < 1 \\ ax + 1 & : x \geq 1 \end{cases}$$

Find the value of a that would make f continuous at $x = 1$.

(b) Determine all vertical and horizontal asymptotes of $f(x) = \frac{2x^2 + 1}{x^2 - 2x - 8}$.

Question 3) (6 points)

Find the derivative of the following functions:

a) $f(x) = (3x + 1)^5 \cdot \sqrt{x}$

b) $f(x) = \frac{3x - 2}{x^2 + 1}$

c) $f(x) = \cos^2 3x$

Question 4) (4 points)

a) Find the equation of the tangent to $f(x) = 2x^3 - \frac{5}{x} + 2\sqrt{x}$ at $x = 1$.

b) Let $f(x) = \begin{cases} 2x+1 & : x < 0 \\ 3x+1 & : x \geq 0 \end{cases}$

Determine whether or not f is differentiable at $x = 0$, and if yes, then find $f'(0)$.