MCS 101 - Mathematics for International Trade I

MIDTERM 2-Sample Exam

Question	Grade	Out of
1		
2		
3		
4		
5		
Total		

STUDENT NUMBER:

NAME-SURNAME:

SIGNATURE:

DURATION: 90 minutes

IMPORTANT NOTES:

1) Please make sure that you have written your student number and name above.

2) Check that the exam paper contains 5 problems.

3) Show all your work. No points will be given to correct answers without reasonable work.

4) Your exam will not be graded, if you don't take the exam at the right place.

1) a) You invest $100 into an account that earns %2 interest compounded continuously. How long will it take for the value of the account to double?

b) What intereset rate (compounded quarterly) is required for the value of an investment to triple in 20 years?

2) Evaluate the following limits and explain your answers.

a) $\lim\limits_{x \to 1} \dfrac{2x^2 - 3x + 1}{x^2 - 3x + 2}$

b) $\lim\limits_{x \to -\infty} \dfrac{5 + 4x^2 - 3x^4}{7x^4 - 5x - 3}$

c) $\lim\limits_{x \to 1} \dfrac{\sqrt{x} - 2}{x - 4}$

d) $\lim\limits_{x \to 0^+} \left(\dfrac{x}{5} + \dfrac{5}{x} \right)$

3) Let $f(x) = \begin{cases} 3x^3 + x^2, & \text{if } x > 1 \\ k, & \text{if } x = 1 \\ x + a, & \text{if } x < 1 \end{cases}$

where k and a are constants.

a) For the given function evaluate the following limits;

$$\lim_{x \to 1^+} f(x), \ \lim_{x \to 1^-} f(x), \ \lim_{x \to +\infty} f(x), \ \lim_{x \to -\infty} f(x)$$

b) What is the value of a if $\lim_{x \to 1} f(x)$ exists.

c) What is the value of k if $f(x)$ is continuous at $x = 1$? Explain your answer.

4) Given $f(x) = x^3 + 4x^2 + 1$

    a) Find $f'(x)$.
    b) Evaluate $f'(1)$.
    c) Find an equation of the tangent line at $x = 0$.

5) Evaluate the derivatives of the following functions.

a) $y = \dfrac{x \cdot x^2 \cdot x^3}{\sqrt[4]{x}}$

b) $y = \sqrt{x}(x^2 + x + 1)$

c) $y = \dfrac{x^2 + 1}{2x^3 + 4}$

d) $y = 1 + \dfrac{1}{x + 1}$