NAME .....

STUDENT ID .....

DEGREE .....

Are You Approved for Extra Time in Exams (LENS students only) .....

Examination Procedures

- This exam will start at 17:05, and will last 45 minutes.
- Each question will be worth 1 Mark each. There are 10 Marks worth of questions.
- All questions must be attempted (LENS students please see below)
- Write **all of your answers** in the exam script. Write the script number on any other documents you submit.
- It is your responsibility to return the script to the collection box. An audit of scripts will take place immediately after the exam. If your script is not accounted for in that audit, you are deemed to be absent, and will receive no marks.
- **LENS Students:** Specifically approved LENS students have to answer any selection of questions that have an aggregate total of 7 Marks.

Formula Sheet

Logarithms

If $a^b = c$ then $\log_a c = b$.

Change of Base Formula

$$\log_A(B) = \frac{\log_e(B)}{\log_e(A)}$$

Sum and Difference of Two Cubes

$$a^3 + b^3 = (a - b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Sequences and Series

Finite Series

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$$

Arithmetic Series:

$$S_n = \frac{n}{2}\left(2a + (n-1)d\right)$$

Geometric Series:

$$S_n = a\left(\frac{1 - r^n}{1 - r}\right)$$

$$S_\infty = \frac{a}{1 - r}$$

Part A Fundamentals of Mathematics (2 Marks)

(i) (1 Mark) Determine the values of A and B from the following expression

$$\frac{8}{x^2-1} = \frac{A}{x-1} + \frac{B}{x+1}$$

(ii) (1 Mark) Find the value of x

$$e^{x^2+5} = 8103.084$$

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Part B Limits of Functions (4 Marks)

(iiii) (1 Mark) Evaluate the following limits

$$\lim_{x \to 5} \frac{x^2 - 25}{x - 5}$$

(iv) (1 Mark) Evaluate the following limits

$$\lim_{x \to 3} \frac{x^3 - 27}{x - 3}$$

(v) (1 Mark) Evaluate the following limits

$$\lim_{x\to\infty} \frac{x+1}{x^2+x}$$

(vi) Compute the limit of the following function

$$\lim_{x\to\infty} \frac{6+x^2-7x^3}{4x^3-6x+2}$$

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Part C Sequences and Series (4 Marks)

(vii) (1 Mark) Compute the following summation

$$\sum_{i=10}^{30} i$$

(viii) (1 Mark) Find the sum of the following geometric series:

$$2 + 6 + 18 + \ldots + 39366$$

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(ix) (1 Mark) Express the following repeating decimal number as a simple fraction. Show your workings.

$$0.459459459....$$

(Simplify your answer such that both the numerator and the denominator are prime numbers.)

(x) (1 Marks) The three tersm below are three successive terms in an aritmetic progression. Compute the value for x, and the common difference d

$$\ldots,\ 3x-1,\ 2x+6,\ 5x-7,\ \ldots$$