



Sri Lanka Institute of Information Technology

B.Sc. Degree  
in  
Information Technology

Mid -Term Examination  
Year 1, Semester 1 (2014)

Mathematics for Information Technology (N109)

Duration: 1 Hour

Instruction to Candidates:

- ◆ This paper contains 7 questions on 1 page without the cover page.
- ◆ Answer all questions on the WORKBOOK provided.
- ◆ Read all questions before start answering.
- ◆ The total marks obtainable for this examination is 30.
- ◆ This is a closed book examination.
- ◆ Calculators are NOT permitted for this examination.



1) Specify the domain of the given functions.

i)  $f(x) = \frac{1}{x^2 - x}$

ii)  $g(x) = -\sqrt{-2x + 3}$

(2 marks)

2) Use calculus to sketch the graph of  $f(x) = x^{\frac{4}{3}} - 4x^{\frac{1}{3}}$ . Find the relative extrema and inflection points if any.

(6 marks)

3) Solve the given exponential equation for  $x$ .

$$5 = 1 + 4e^{-6x}$$

(2 marks)

4) Differentiate the given functions.

i)  $y = \frac{e^{x^2+2x-1}}{x}$

ii)  $y = -5e^x + 10x^3 \ln x$

iii)  $y = \ln \frac{x(x^2+1)^2}{\sqrt{2x^3+1}}$

(6 marks)

5) An apartment complex has 300 apartments to rent. If they rent  $x$  apartments then their monthly profit, in dollars, is given by,

$$P(x) = -4x^2 + 1600x - 40,000$$

How many apartments should they rent in order to maximize their profit?

*Hint: Note that there is a constraint on the number of apartments  $x$  which is  $0 \leq x \leq 300$ .*

(4 marks)

6) Find the anti-derivative of the given indefinite integrals.

i)  $\int x^3 - x^{-3} + 2x + 1 \, dx$

ii)  $\int (x-1)(x+1) \, dx$

iii)  $\int e^{3x+2} \, dx$

iv)  $\int x \ln |x| \, dx$

(7 marks)

7) If  $f'(x) = 3x^2 - 1$ , and  $f(2) = 4$ , then find an expression for  $f(x)$ .

(3 marks)

**End of the Question Paper**

