UNIVERSITY OF SWAZILAND

FINAL EXAMINATIONS 2006/7

B.A.S.S. I

TITLE OF PAPER	:	ELEMENTARY QUANTITATIVE METHODS 1
COURSE NUMBER	:	MS 011
TIME ALLOWED	:	THREE (3) HOURS
INSTRUCTIONS	:	1. THIS PAPER CONSISTS OF SEVEN QUESTIONS.
		2. ANSWER ANY FIVE QUESTIONS
SPECIAL REQUIREMENTS	:	NONE

THIS EXAMINATION PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR.

Question 1

(a) Express as a single fraction in its simplest form

$$\frac{x}{x+1} - \frac{2}{x+3}$$

[6 marks]

(b) Simplify the expression

$$\frac{\cos^2 x - \sin^2 x}{\cos x + \sin x}$$

[6 marks]

(c) Evaluate the fraction

$$\frac{5x^5 y^4 d^7}{3q^5 r^6} \div \frac{2m^2 y^3 d^2}{q^2 r^4 f^2}$$

[8 marks]

Question 2

(a) Factorise the following expression

    (i) $x^2 - b^2 + x + b$ **[6 marks]**

    (ii) $\cos^2 x - 5\cos x + 6$ **[6 marks]**

(b) Solve the trigonometric equation

$$2\sin x - 1 = 0 \quad \text{for} \quad 0 < x \leq 180^o$$

[8 marks]

Question 3

(a) Given $f(x) = \dfrac{2t+1}{t+5}$, find

    (i) $f(0)$ [5 marks]

    (ii) $f^{-1}(-2)$ [7 marks]

(b) Find the equation of a straight line that is perpendicular to the line $3y - 4x = 5$ and passing through the print $(-2, 7)$.

                                                                               [8 marks]

Question 4

A trader bought some paraffin for E500. He paid Ex for each litre of paraffin.

(a) Find, in terms of x, an expression for the number of litres he bought.

                                                                                    [3 marks]

(b) Due to a leak, he lost 3 litres of paraffin. He sold the reminder of the paraffin for E1 per litre more than he paid for it.

    Write down an expression, in terms of x, for the sum of money he received.   [5 marks]

(c) He made a profit of E20. Write down an equation in x to represent this information, and show that it reduces to $3x^2 + 23x - 500 = 0$.   [8 marks]

(d) Solve the equation $3x^2 + 23x - 500 = 0$, giving answers correct to one decimal.   [4 marks]

Question 5

(a) Use the remainder theorem to find the remainder when

   $P(x) = 2x^2 - x + 1$ is divided by $x + 2$ **[6 marks]**

(b) Use long division to find the quotient and remainder when
   $P(x) = 4x^3 + 2x^2 + x - 1$ is divided by $x - 3$ **[10 marks]**

(c) Show that $x = -1$ is a root of the polynomial $P(x) = x^3 - x^2 + 2$ **[4 marks]**

Question 6

(a) A student invests E3600 into an account that offers 7% simple interest. How much is in the account after 9 months?

   [5 marks]

(b) Prove the following identities

   (i) $\dfrac{\cot \theta}{\tan \theta} + 1 \equiv csc^2\theta$

   (ii) $(1 + \tan^2 \theta)(1 - \sin^2 \theta) \equiv 1$ **[15 marks]**

Question 7

(a) Solve the following logarithmic equations

   (i) $2 \log_5 x = \log_5(2x + 3)$

   (ii) $\log_2(2x^2 + 3x + 5) = 3 + \log_2(x + 1)$

   [15 marks]

(b) After how many years will a principal amount of E5000 double if invested into an account offering 7% interest compounded quarterly?

   [7 marks]

******** *END OF EXAMINATION* ********