UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2010/2011

COURSE	:	MATHEMATICS FOR REAL ESTATE MANAGEMENT
CODE	:	BWM 10702 / BSM 1812
PROGRAMME	:	1 BPD
DATE	:	NOVEMBER / DECEMBER 2010
DURATION	:	2 HOURS
INSTRUCTION	:	ANSWER ALL QUESTIONS IN **PART A** AND CHOOSE **TWO (2)** QUESTIONS ONLY IN **PART B**

THIS EXAMINATION PAPER CONSISTS OF 7 PAGES

PART A

Q1 (a) Differentiate each of the following function.

(i) $y = \ln\sqrt{x^2 + 1}$.

(ii) $y = e^{2x} \ln 5x$.

(iii) $y = 3x^4 - 5x + \sqrt{x}$.

(7 marks)

(b) If $y = \dfrac{(2x-3)^2}{(4+3x)^3}$, find the values of x when $\dfrac{dy}{dx} = 0$.

(10 marks)

(c) A firm determines that the daily cost to produce x units of products is given by

$$C(x) = 3{,}000 + 20x, \qquad 0 \le x \le 500$$

and the demand function for the products is given by,

$$p(x) = 1000 - x, \qquad 0 \le x \le 500.$$

(i) Find the revenue function, $R(x)$ and marginal revenue, $R'(x)$.

(ii) Find the profit function, $P(x)$ and marginal profit, $P'(x)$.

(iii) Determine how many units the company must produce and sell each day to maximize the profit.

(iv) Find the maximum profit.

(8 marks)

Q2 (a) Evaluate the integral below.

(i) $\int \left(x^5 + \sqrt{x} - \frac{1}{x^2} \right) dx$.

(ii) $\int (1+\sin t)^9 \cos t \, dt$.

(7 marks)

(b) Given $\int_2^7 f(x)\,dx = 5$, find:

(i) $\int_2^7 3f(x)\,dx$.

(ii) $\int_2^7 \left[f(x) + 2 \right] dx$.

(iii) $\int_7^2 \left[f(x) - x^2 \right] dx$.

(9 marks)

(c) Refer to **Figure Q2**.

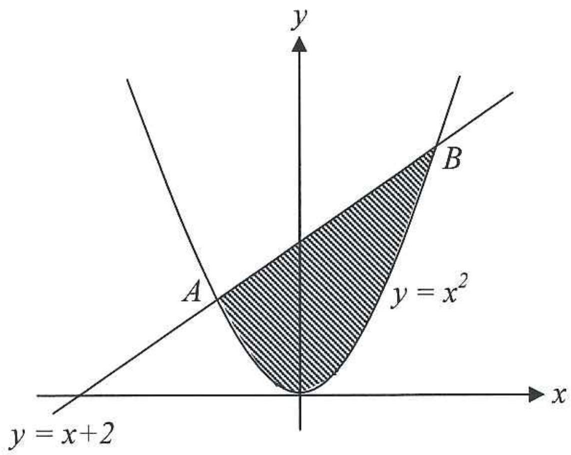

Figure Q2

(i) Find the coordinates of A and B.

(ii) Find the area of the shaded region.

(9 marks)

PART B

Q3 (a) Solve the following inequalities.

(i) $2x - 3 \leq 7 - 7x \leq 3x + 7$.

(ii) $|4x + 3| < 12$.

(7 marks)

(b) A set menu consists of: two starters (soup and bread), two main courses (pasta and fish), and two desserts (ice cream and cheesecake). Draw a tree diagram to illustrate all the possible combinations of courses. How many possible combinations are there?

(4 marks)

(c) Given $2\begin{pmatrix} -13 & 7 \\ 12 & 11 \end{pmatrix} + 3\begin{pmatrix} 4 & 0 \\ -1 & y \end{pmatrix} = 7\begin{pmatrix} x & 2 \\ 3 & 1 \end{pmatrix}$. Find the values of x and y.

(5 marks)

(d) Solve the system below by using the Gauss-Jordan elimination method.

$$\begin{aligned} x + y + z &= 7 \\ 2x + 3y - z &= 12 \\ 3x + 2y - 4z &= 13 \end{aligned}$$

(9 marks)

Q4 (a) Determine, using truth tables, whether or not the following propositions are tautologies or contradiction.

$$(p \wedge q) \wedge (\sim (p \vee q)).$$

(4 marks)

(b) Show that $\sim (p \Rightarrow q) \equiv p \wedge \sim q$.

(4 marks)

(c) Michigan Polar Products makes downhill and cross-country skis. A pair of downhill skis requires 2 man-hours for cutting, 1 man-hour for shaping and 3 man-hours for finishing while a pair of cross-country skis requires 2 man-hours for cutting, 2 man-hours for shaping and 1 man-hour for finishing. Each day the company has available 140 man-hours for cutting, 120 man-hours for shaping and 150 man-hours for finishing. A pair of downhill skis yields a profit of RM10 and a pair of cross-country skis yields a profit of RM8.

(i) Obtain a linear programming model for this problem.

(ii) By using the geometrical approach, how many pairs of each type of ski should the company manufacture each day in order to maximize profits.

(17 marks)

Q5 (a) Find the number of different arrangements of the letters of the word MATHEMATICS.

(3 marks)

(b) Let $\mathbf{u} = 4\mathbf{i} + \mathbf{k}$, $\mathbf{v} = 2\mathbf{i} - \mathbf{j}$ and $\mathbf{w} = a\mathbf{i} + 3\mathbf{j} - 4b\mathbf{k}$. Find

(i) $4\mathbf{u} - 3\mathbf{v} + \mathbf{w}$,

(ii) $\mathbf{u} \times \mathbf{v}$,

(iii) the value of a and b if $4\mathbf{u} - 3\mathbf{v} + \mathbf{w} = 3(\mathbf{u} \times \mathbf{v})$.

(9 marks)

(c) By using algebraic approach, find the minimum value of

$$w = 2x_1 + 10x_2 + 8x_3$$

subject to the constraints

$$\begin{aligned} x_1 + x_2 + x_3 &\geq 6 \\ x_2 + 2x_3 &\geq 8 \\ -x_1 + 2x_2 + 2x_3 &\geq 4 \end{aligned}$$

where

$$x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0.$$

(13 marks)

FINAL EXAMINATION

SEMESTER / SESSION: SEM I / 2010/2011 COURSE : 1 BPD

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Formulae

Differentiation And Integration Formula

Differentiation	Integration
$\frac{d}{dx}x^n = nx^{n-1}$	$\int x^n dx = \frac{x^{n+1}}{n+1} + C, \quad n \neq -1$
$\frac{d}{dx}\ln x = \frac{1}{x}$	$\int \frac{1}{x}\, dx = \ln \vert x \vert + C$
$\frac{d}{dx}\log_b x = \frac{1}{x \ln b}$	$\int \frac{1}{x \ln b} dx = \log_b x + C$
$\frac{d}{dx}e^x = e^x$	$\int e^x dx = e^x + C$
$\frac{d}{dx}b^x = b^x \ln b$	$\int b^x \ln b\, dx = b^x + C$
$\frac{d}{dx}\sin x = \cos x$	$\int \cos x\, dx = \sin x + C$
$\frac{d}{dx}\cos x = -\sin x$	$\int \sin x\, dx = -\cos x + C$
$\frac{d}{dx}\tan x = \sec^2 x$	$\int \sec^2 x\, dx = \tan x + C$
$\frac{d}{dx}\cot x = -\csc^2 x$	$\int \csc^2 x\, dx = -\cot x + C$
$\frac{d}{dx}\sec x = \sec x \tan x$	$\int \sec x \tan x\, dx = \sec x + C$
$\frac{d}{dx}\csc x = -\csc x \cot x$	$\int \csc x \cot x\, dx = -\csc x + C$