CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

Course	Number		Section(s)
Mathematics	208/4		All except EC
Examination	**Date**	**Time**	**Pages**
Final	April 2013	3 Hours	3
Instructors			**Course Examiner**
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FORMULAE:

$$A = P(1+i)^n, \quad A = Pe^{rt}, \quad FV = PMT\,\frac{(1+i)^n - 1}{i}, \quad PV = PMT\,\frac{1-(1+i)^{-n}}{i}$$

Special Instructions:

- Answer all questions.
- **Only approved calculators are allowed.**

MARKS

[10] **1.** Joanne Ha sells silk-screened T-shirts at community festivals and crafts fairs. Her marginal cost to produce one T-shirt is \$3.50. Her total cost to produce 60 T-shirts is \$300, and she sells them for \$8.5 each.

(A) Find the linear cost function for Joanne's T-shirt production.

(B) How many T-shirts must she produce and sell in order to break even?

(C) How many T-shirts must she produce and sell to make a profit of \$500?

[10] **2.** Solve for x in the following equations:

(A) $\left(\frac{5}{6}\right)^x = \frac{36}{25}$

(B) $(4)^{x+1} = (8)^{2-x}$

(C) $\log_5(x+6) + \log_5(x+2) = 1$

(D) $\log_2(2x) = 4 - \log_2(x+2)$

(E) $\log_3\left(\frac{5x}{x-2}\right) = 2$

[10] **3.** For $f(x) = -28x + 6$ and $g(x) = 5(1.8)^x$, find the following:

(A) $\sum_{k=0}^{41} f(k) = f(0) + f(1) + f(2) + \cdots + f(41)$

(B) $\sum_{h=0}^{30} g(h) = g(0) + g(1) + g(2) + \cdots + g(30)$

[10] **4.** Joe Seniw bought a rare stamp for his collection. He agreed to pay a lump sum of \$4,000 after 5 years. Until then, he pays 6% simple interest semi-annually.

(A) Find the amount of each semi-annual interest payment.

(B) Snew sets up a sinking fund so that enough money will be present to pay off the \$4,000. He wants to make annual payments into the fund. The account pays 8% compounded annually. Find the amount of each payment.

(C) Prepare a table showing the amount in the sinking fund after each deposit.

[10] **5.** The Beys plan to purchase a home for \$212,000. They will pay 20% down and finance the reminder for 30 years at 7.2% interest, compounded monthly.

(A) How large are their monthly payments?

(B) What will be their approximate loan balance right after they have made their 96th payment?

(C) How much interest will they pay during the 8th year of the loan?

[10] **6.** Solve by using Gauss-Jordan Elimination:

$$x_1 - x_2 + 5x_3 = -6$$

$$3x_1 + 3x_2 - x_3 = 10$$

$$x_1 + 3x_2 + 2x_3 = 5$$

No other method of solving these systems of equations will be accepted!

[10] **7.** An island economy consists of the sectors of tourism, agriculture and fishing. To produce a dollar's worth of tourism requires an input of \$0.30, \$0.10 and \$0.20 from tourism, agriculture and fishing respectively. A dollar's worth of agriculture requires inputs of \$0.30, \$0.10 and \$0.20 from tourism, agriculture and fishing respectively. On the other hand, a dollar's worth of fishing requires inputs of \$0.10 from each sector.

(A) Write the technological matrix M for this island economy.

(B) If a final demand of \$30 million, \$10 million and \$20 million from tourism, agriculture and fishing is to be met, set up the equation to be satisfied by the inputs from the respective sectors.

(C) Solve the respective inputs satisfying these demands.

[10] **8.** Extremize $P(x, y) = 10x + 25y$ subject to

$$x + 2y \leq 20,\ 3x + 2y \geq 24,\ x \leq 6,\ x \geq 0,\ y \geq 0.$$

[10] **9.** A package contains 100 fuses, of which 10 are defective. A Sample of 5 fuses is selected at random.

(A) How many different samples are there?

(B) How many of the samples contain 2 defective fuses?

(C) How many of the samples contain at least 1 defective fuse?

[10] **10.** John is having a dinner party and is limited to 10 guests. He has 16 men friends and 12 women friends, including Laura and Mary.

(A) If John chooses his guests at random, what is the probability that Mary and Laura are invited?

(B) If John decides to invite 5 men and 5 women, what is the probability that Mary and Laura are invited?