CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

Course	Number		Section(s)
Mathematics	208/4		All except EC
Examination	**Date**	**Time**	**Pages**
Final	April 2012	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.** At a price of \$1.94 per bushel, the supply of corn is 9,800 million bushels and the demand is 9,300 million bushels. At a price of \$1.82 per bushel, the supply of corn is 9,400 million bushels and the demand is 9,500 million bushels.

(A) Find a price-supply equation of the form $p = mx + b$.

(B) Find a price-demand equation of the form $p = mx + b$.

(C) Find the equilibrium point.

(D) Graph the price-supply equation, price-demand equation, and equilibrium point in the same coordinate system.

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

(A) $3^{3x-x^2} = \frac{1}{81}$

(B) $(81)^{2x} = (9)^{x^2-12}$

(C) $3\log_b 2 + \frac{1}{2}\log_b 25 - \log_b 20 = \log_b x$

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

(E) $\log_4(x^2+x+4) = 2$

[10] **3.** For $f(x) = -22x + 16$ and $g(x) = 5(0.8)^x$, find the following:

(A) $\sum_{k=0}^{40} f(k) = f(0) + f(1) + f(2) + \cdots + f(40)$

(B) $\sum_{h=0}^{29} g(h) = g(0) + g(1) + g(2) + \cdots + g(29)$

[10] **4.** You have decided to take a two day "Earth Orbital Tour", offered by NASA Enterprises Inc. four years from now. This little adventure will cost you \$100,000. Your local loan shark offers you 7.2% interest compounded bi-monthly(twice each month).

(A) The total amount of \$100,000 must be paid by the date of departure date (four years from now). What are your bi-monthly payments?

(B) How much interest have you earned?

(C) If you could only afford bi-monthly payments of \$800, how long would it take you to save up for your Space vacation fund?

[10] **5.** The Perez family buys a house for \$275,000 with a down payment of \$55,000. They take out a 30 year mortgage for \$220,000 at an annual interest rate of 6% compounded monthly.

(A) Find the amount of the monthly payment needed to amortize this loan.

(B) Find the total amount of interest paid when the loan is amortized over 30 years.

(C) Find the part of the first payment that is interest and the part that is applied to reducing the debt.

[10] **6.** A corporation wants to lease a fleet of 12 airplanes with a combined carrying capacity of 220 passengers. The three available types of planes carry 10, 15, and 20 passengers, respectively.

(A) How many of each type of plane should be leased?

(B) The cost of leasing a 10-passengers airplane is \$8,000 per month, a 15-passengers airplane is \$14,000 per month, and a 20-passengers airplane is \$16,000 per month. Which of the solutions would minimize the monthly leasing cost?

[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 \$0.3, \$0.2 and \$0.1 from tourism, agriculture and fishing respectively. A dollar's worth of agriculture requires inputs of \$0.1 from each sector. On the other hand, a dollar's worth of fishing requires inputs of \$0.3, \$0.2 and \$0.1 from the sectors of tourism, agriculture and fishing.

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

(B) If a final demand of \$20 million, \$5 million and \$10 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 $P(x, y) = 15x + 5y$ subject to

$$2x + y \leq 40,\ 20x + 2y \geq 36,\ 6x + 15y \geq 108,\ x \geq 0,\ y \geq 0.$$

[10] **9.** A clothing store chain has 5, 8 and 12 stores in New Brunswick, Nova Scotia and Quebec respectively.

(A) The chain decides to close 10 of its stores. In how many ways can this be accomplished?

(B) If the chain decides to close 2, 4, and 4 stores in New Brunswick, Nova Scotia and Quebec respectively, in how many ways can this be done?

[10] **10.** Ann and Barbara are playing a tennis match. The first player to win 2 sets wins the match. For any given set, the probability that Ann wins the set is $\frac{2}{3}$. Find the probability that

(A) Ann wins the match.

(B) 3 sets are played.

(C) The player who wins the first set goes on to win the match.