AN eCONCORDIA EXAMINATION

CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

Course	Number		Section(s)
Mathematics	208/4		EConcordia
Examination	**Date**	**Time**	**Pages**
Final	April 2015	3 Hours	3
Instructor			**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.**
- ▷ **This examination counts for 50% towards your final grade.**

MARKS

[10] **1.** At a price of \$2.28 per bushel, the supply of barley is 7,500 million bushels and the demand is 7,900 million bushels. At a price of \$2.37 per bushel, the supply of barley is 7,900 million bushels and the demand is 7,800 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.

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

(A) $4^{x^2}(2^{5x}) = 8$

(B) $3^{x^2+x} = \sqrt{3}$

(C) $\log_2 \sqrt{2y^2} - 1 = \frac{3}{2}$

(D) $\log_{11}(x+7) - \log_{11}(x+10) = \log_{11} 0.5$

(E) $\log_2(\log_2 x) = 1$

[10] **3.** For $f(x) = -24x + 32$ and $g(x) = 6(0.4)^x$ find the following:

(A) $\sum_{k=0}^{29} f(k) = f(0) + f(1) + f(2) + \cdots + f(29)$.

(B) $\sum_{h=1}^{19} g(h) = g(1) + g(2) + g(3) + \cdots + g(19)$.

(C) What is $\sum_{h=0}^{\infty} g(h) = g(0) + g(1) + g(2) + \cdots + g(n) + g(n+1) + \ldots$?

[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 semiannually.

(A) Find the amount of each semiannual interest payment.

(B) Seniw 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.

[10] **5.** The Rechtien family buys a house for \$140,000 with a down payment of \$30,000. The family takes out a 30-year, \$110,000 mortgage at an annual interest rate of 6.6%.

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

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

$$2x_1 - x_2 + x_3 = -9$$

$$4x_1 + 4x_2 - 4x_3 = 24$$

$$x_1 - 2x_2 + 3x_3 = 1$$

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 \$0.2 from each sector. A dollar's worth of agriculture requires inputs of \$0.4, \$0.1 and \$0.1 from tourism, agriculture and fishing respectively. On the other hand, a dollar's worth of fishing requires inputs of \$0.3, \$0.1 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 \$10 million, \$15 million and \$20 million from tourism, agriculture and fishing is to be met, then 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 $P(x, y) = 50x + 50y$ subject to

$$5x + 8y \geq 200,\ 25x - 10y \geq 250,\ 4x + 4y \leq 600,\ x \geq 0,\ y \geq 0\,.$$

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

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

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

[10] **10.** A large computer company A subcontracts the manufacturing of its circuit boards to two companies, 40% to company B and 60% to company C. Company B in turn subcontracts 70% of the orders it receives from company A to company D and the remaining 30% to company E, both subsidiaries of company B. When the boards are completed by companies D, E, and C, they are shipped to company A to be used in various computer models. It has been found that 1.5%, 1%, and 0.5%, of the boards from D, E, and C, respectively, prove defective during the 90-day warranty period after a computer is first sold.

(A) What is the probability that a given board in a computer will be defective during 90-day warranty period?

(B) What is the probability that a circuit board in a completed computer came from company E or C?