

CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

Course	Number	Section(s)	
Mathematics	208/2	All except EC	
Examination	Date	Time	Pages
Final	December 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. 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 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.
 - (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) $(2^{x+1})8^{-x} = 4$
 - (B) $(e^4)^x (e^{x^2}) = e^{12}$
 - (C) $\log_{10} x + \log_{10}(x + 15) = 2$
 - (D) $\log_{10}(x - 1) - \log_{10}(x + 1) = 1$
 - (E) $\log_6(x + 3) + \log_6(x + 4) = 1$

- [10] 3. For $f(x) = 100 - 20x$ and $g(x) = 8(0.8)^x$ find the followings using only proper formula:

$$(A) \sum_{k=1}^{50} f(k) = f(1) + f(2) + f(3) + \cdots + f(50).$$

$$(B) \sum_{h=0}^{39} g(h) = g(0) + g(1) + g(2) + \cdots + g(39).$$

- [10] 4. John deposits \$2,000 in an IRA on his 21st birthday and on each subsequent birthday up to, and including, his 29th. The account earns 8% compounded annually.

(A) If John leaves the money in the account without making any more deposits, how much will he have on his 65th birthday, assuming the account continues to earn the same rate of interest?

(B) How much would be in the account on his 65th birthday if he had started the deposits on his 30th birthday and continued making deposits on each birthday until (and including) his 65th birthday?

- [10] 5. A person wants to establish an annuity for retirement purposes. He wants to make quarterly deposits for 20 years so that he can then make quarterly withdrawals of \$5,000 for 10 years. The annuity earns 7.32% interest compounded quarterly.

(A) How much will have to be in the account at the time the person retires?

(B) How much should be deposited each quarter for 20 years in order to accumulate the required amount?

(C) What is the total amount of interest earned during the 30-year period?

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

$$3x_1 - x_2 - 2x_3 = -10$$

$$2x_1 + 4x_2 - x_3 = -1$$

$$4x_1 - 2x_2 + 3x_3 = 3$$

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 \$0.3, \$0.1 and \$0.2 from tourism, agriculture and fishing respectively. A dollar's worth of agriculture requires inputs of \$0.3, \$0.1 and \$0.2 from the sectors of tourism, agriculture and fishing respectively. On the other hand, a dollar's worth of fishing requires inputs of \$0.1 from each sector.
- (A) Write the technological matrix M for this island economy.
- (B) If a final demand of \$25 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 $P(x, y) = 60x + 20y$ subject to
- $$12x + 12y \geq 24, 6x + 4y \leq 36, 10x + 5y \leq 50, x \geq 0, y \geq 0.$$
- [10] 9. A computer manufacturer has 50 distinct microchips to place into a rectangular array that is 5 units wide by 10 units long.
- (A) Ten of the chips control special functions. How many arrangements are possible if these chips must occupy the first column?
- (B) Find the number of arrangements having no special-function chips in the first column.
- [10] 10. Twelve popular brands of beer are used in a blind taste study for consumer recognition.
- (A) If 4 distinct brands are chosen at random from the 12 and if a consumer is not allowed to repeat any answer, what is the probability that all 4 brands could be identified by just guessing?
- (B) If repeats are allowed in the 4 brands chosen at random from the 12 and if a consumer is allowed to repeat answers, what is the probability that all 4 brands are identified correctly by just guessing?

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