CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

Course	Number		Section(s)
Mathematics	208/2		All
Examination	**Date**	**Time**	**Pages**
Midterm	November 2015	1 Hour 30 minutes	2
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

[5+5] **1.** A manufacturer has been selling 1200 television sets a week at \$480 each. A market survey indicates that for each \$30 rebate offered to a buyer, the number of sets sold will increase by 300 per week.

(A) Find the demand function $p(x)$, where x is the number of the television sets sold per week and $p(x)$ is the price of one set.

(B) How large rebate should the company offer to a buyer, in order to maximize its revenue?

[$2\frac{1}{2} \times 4$] **2.** Solve for x in the following equations:

(A) $7^{x^2+x-9} = 343^{-3x+5}$

(B) $\log_2(x-3) + \log_2(2x-4) = 2$

(C) $e^{x^2-2x+5} = \left(\frac{1}{\sqrt[4]{e}}\right)^{-8x^2+12x+28}$

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

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[3+4)+3] **3.**

(A) If the 8th and 19th terms of an arithmetic sequence are 9 and -24 respectively, find the 50th term and the sum of the first 61 terms of the sequence.

(B) Find the sum of the entire infinite geometric sequence $2, -\frac{1}{2}, \frac{1}{8}, \ldots\ldots\ldots\ldots$, if it exists.

[5+5] **4.** A radio commercial for a loan company states: "You only pay \$0.29 a day for each \$500 borrowed." If you borrow \$1,500 for 120 days, what amount will you repay, and what annual interest rate is the company actually charging?

[5+5] **5.** A bond issue is approved for building a marina in a city. The city is required to make regular payments every 3 months into a sinking fund paying 5.4% compounded quarterly. At the end of 10 years, the bond obligation will be retired with a cost of $\$5,000,000$.

(A) What should each payment be?

(B) How much interest is earned during the 10th year?

[5+5] **6.** Consider a $\$21,281.27$ loan for 7 years at 8% interest compounded quarterly and a payment of \$1000 per quarter-year.

(A) Compute the unpaid balance after 5 years.

(B) How much interest is paid during the fifth year?