

CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

| Course | Number | Section(s) | |
|--|-----------------|-------------------|-------|
| Mathematics | 208/2 | All | |
| Examination | Date | Time | Pages |
| Midterm | October 2019 | 1 Hour 30 minutes | 2 |
| Instructors | Course Examiner | | |
| F. Romanelli, H. Greenspan, I. Gorelyshev, M. Padamadan, R. Mearns, U. Tiwari | D. Sen | | |

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) $\left(\frac{5}{4}\right)^{x^2-42} = \left(\frac{64}{125}\right)^{2x-10}$

(B) $2 \ln(2x) - \ln(3x-2) = 3 \ln 4 - \frac{4}{5} \ln 32 + \ln 1$

(C) $e^{-2x^2+x-5} = \left(\frac{1}{e}\right)^{x^2-3x+20}$

(D) $\log(x+5) - \log(2x-1) = 2 \log \sqrt{3}$

PLEASE TURN OVER

- [5+5] 3.
- (A) If the first and 10th terms of an arithmetic sequence are 3 and 30 respectively, find the 48th term of the sequence.
 - (B) If the first term of a geometric sequence is 300 and the third term is 3, find the sum of the first 40 terms.
- [10] 4. A person deposits \$2000 to a savings account at the end of each year. The account pays 2% interest compounded annually. If the first deposit is made at the end of the year 2012 and the last deposit is made at the end of the year 2022, what will be the balance in the account immediately after the last deposit.
- [5+5] 5. A small business owner contributes \$3,000 at the end of each quarter to a retirement account that earns 8% compounded quarterly.
- (A) How long will it be until the account is worth \$150,000?
 - (B) Suppose that when the account reaches \$150,000, the business owner increases the contributions to \$5,000 at the end of each quarter. What will the total value of the account be after 15 more years?
- [4+3+3] 6. You are buying a \$20,000 boat with a down-payment of \$4,000 and you finance the remaining amount with a 3 year loan at 7.8% compounded weekly.
- (A) What are your weekly payments?
 - (B) What is the remaining balance after 2 years?
 - (C) How much are you saving by paying the remaining balance after 2 years?