



McGill

School of
Continuing Studies

École
d'éducation permanente

Department of Career and Professional Development

FALL 2017

MIDTERM EXAMINATION

FOUNDATIONS OF MATHEMATICS – CMSC 000

Date: October, 21st 2017

Lecturer: Artour Tomberg

STUDENT NAME

STUDENT NUMBER

INSTRUCTIONS:

You have three (3) hours to complete this closed-book exam, allot your time accordingly.

- This is a closed book exam.
- **MARK ALL OF YOUR FINAL ANSWERS CLEARLY IN THE EXAMINATION BOOKLET IN PEN**
- Do not tear any of the pages of the exam booklet and show all steps when solving the problems (part marks may be given for incomplete solutions, but right answers without proper justification are worth zero)
- Write your name and student number on the cover page of the exam and on all the exam booklets used
- You are permitted **NON-ELECTRONIC Translation DICTIONARIES** - in book format **ONLY**. Handheld devices capable of storing text (e.g. Palm, etc.) are **NOT** permitted.
- You are permitted noiseless **NON-PROGRAMMABLE, NON-TEXT, NON-GRAPHICAL CALCULATORS ONLY**. Handheld devices capable of storing text (e.g. Palm, etc.) are **NOT** permitted.
- This exam consists of 10 questions.
- Total number of pages including cover sheet: 3
- Please ensure you have a complete examination paper before starting.

THIS EXAMINATION PAPER AND ALL EXAM BOOKLETS MUST BE RETURNED

QUESTION 1: (10 points)

Solve the following equation

$$x^2 - 9x + 14 - x(x^2 - 4x + 8) - [-x(x^2 + 3) + 2(2x^2 - 5)] = 0$$

QUESTION 2: (10 points)A) [7 points] Consider the line L given by

$$3x - \frac{1}{2}y - 2 = 0$$

Find the equations of two lines: L_1 parallel to the line L given above and passing through the point $(-1, -1)$ and L_2 which is perpendicular to L and passing through the same point $(-1, -1)$.

B) [3 points] Sketch both lines in your exam booklet, as well as the point $(-1, -1)$, all on the same graph.

QUESTION 3: (20 points) [5 points each]

Find all solutions to the equations:

A) $4x^4 + 16x^3 - 25x^2 - 100x = 0$

B) $3x^3 + 24 = 0$

C) $-12x^2 - 36x - 27 = 0$

D) $x^4 - 256 = 0$

(Hint: Factor as much as possible first).

QUESTION 4: (10 points)Solve the following inequalities (give your final answer in interval form and sketch it on the real line):

A) $7 - 3x \leq x - 5$ AND $5(x - 2) < 3x - 4$

B) $-\left(-\frac{1}{x} + 3\right) < 3\left(\frac{2}{x} - 7\right)$ OR $-3\left(-x + \frac{1}{3}\right) < 3 + 2x$

QUESTION 5: Applications (5 points)

Tickets for a singing competition cost \$11 at the gate and \$5 in advance. 220 tickets were sold in advance. The total revenue for tickets sales was \$4840. How many tickets were sold at the gate? (Write an algebraic equation that describes the problem and solve it to answer the question. No credits will be given otherwise.)

QUESTION 6: (10 points)

Consider the following cubic equation

$$4x^3 + 9x^2 - 49x + 30 = 0$$

You are told that $x = -5$ is one of the solutions to this equation. Use that fact to find the other two solutions. (Hint: Long Division).

Please turn over →

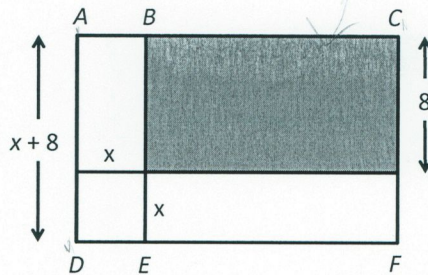
QUESTION 7: (10 points)

Simplify and rewrite the expression using only positive exponents

$$\left[\frac{\left(\frac{3^2 x^{-4} y^2}{3x^{-1} y^{-4}} \right)^{-2}}{(100x^{17} y^{800})^0} \right] \div \left(-\frac{3^6 x^{-1} y^{-2}}{3^5 x y^{-6}} \right)^{-3}$$

QUESTION 8: (10 points)

The total area of the rectangle $ADFC$ shown below is $3x^2 + 27x + 24 \text{ cm}^2$. The area of the shaded region is 120 cm^2 . Use that information to find the dimensions of the total rectangle (that is, its width AD and length DF) in cm and then find the numerical value of its total area in cm^2 .



(Hint: You can use long division to find the expression for the length of AC or DF , then find the expression for the length of BC . Finally, use the numerical value of the area of the shaded region to find the value of x to get AD and DF .)

QUESTION 9: Applications (5 points)

Your company requires you to select one of two annual salary plans. One plan pays a straight \$51000. The second plan pays \$34000 plus a commission of 5% of your total sales. Write an inequality for the total sales for which the second option yields a greater annual salary than the first option. Solve the inequality.

QUESTION 10: Applications (10 points)

A house is bought for \$125 800. With the real estate prices rising, it is estimated that in 2 years, the market value of the house will increase by 42%. (In the following questions, round your answers to two decimal places, e.g. 3.192 becomes 3.19)

- A) Find a linear model for the market value V (in thousands of \$) of the house t years after it was purchased.
- B) Interpret the slope of your model.
- C) What is the market value of the house 13 years after it was bought?
- D) When will the market value of the house pass \$1 million?

GOOD LUCK!