

# Simon Fraser University

## Math 100

**Midterm 2**

**Instructor : Sue Haberman**

**Date: March 7, 2007**

**Time: 11:30 - 12:20 pm**

**Last Name (print):** \_\_\_\_\_ **First Name:** \_\_\_\_\_

**Signature:** \_\_\_\_\_ **SFU Email ID:** \_\_\_\_\_

### **Instructions:**

- 1. Do not open this exam until instructed to do so.**
- 2. Ensure that you have 5 pages of questions numbered page 2 to page 6.**
- 3. No calculators, notes or books are allowed.**
- 4. Give all final numerical answers exactly, simplify all final expressions.**
- 5. For full marks, show all steps leading to your final answer.**
- 6. Answer each question in the space provided. Continue on the back of the previous page if necessary.**

| Question     | Mark | Maximum   |
|--------------|------|-----------|
| 1            |      | 5         |
| 2            |      | 5         |
| 3            |      | 7         |
| 4            |      | 8         |
| 5            |      | 5         |
| <b>TOTAL</b> |      | <b>30</b> |

1. For the quadratic function:  $y = x^2 - 10x + 18$

a) (2 marks) Give the co-ordinates of the vertex of its graph.

b) (1 mark) Give the equation of the axis of symmetry of its graph.

c) (2 marks) Determine the  $x$ -intercepts of its graph. (answer exact and simplified)

2. Given the polynomial function:  $f(x) = 4x^3 - 31x - 15$

a) (1 mark) What is the degree of  $f(x)$  ? \_\_\_\_\_

b) (1 mark) Complete the statement: as  $x \rightarrow -\infty$  ,  $f(x) \rightarrow$  \_\_\_\_\_

c) (3 marks) Given that  $x = -\frac{1}{2}$  is a zero of  $f(x)$  , determine all other zeros. Show all work clearly for full marks.

ANSWER: The zeros of  $f(x)$  are: \_\_\_\_\_

3. A rational function is defined by:  $R(x) = \frac{2x^2 + 6x}{x^2 - 2x + 1} = \frac{2x(x + 3)}{(x - 1)^2}$

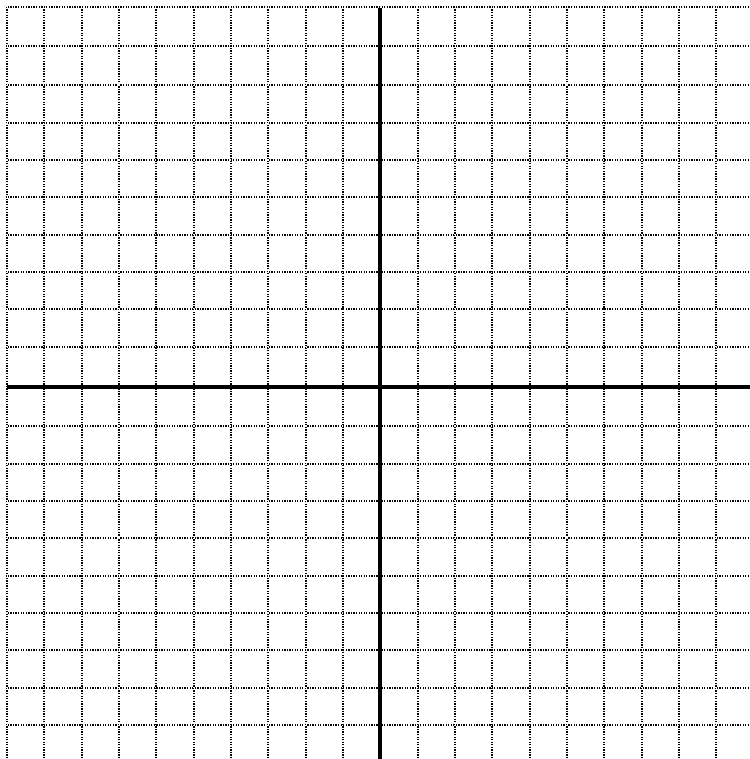
a) (1 mark) Give the  $x$ -intercept(s) of  $R(x)$  . \_\_\_\_\_

b) (1 mark) Give the equation of the horizontal asymptote for the graph. \_\_\_\_\_

c) (2 marks) Use a sign analysis of  $R(x)$  to solve the inequality:  $R(x) \leq 0$

Solution: \_\_\_\_\_

d) (3 marks) Sketch the graph of  $R(x)$  Scale and label the axes. Show asymptotes as dotted lines. Include co-ordinates for at least three points on the graph.



4. a) (4 marks) Give the exact value of each expression:

$$9^{-\frac{3}{2}} = \underline{\hspace{2cm}}$$

$$\log_4 8 = \underline{\hspace{2cm}}$$

$$\log(0.001) = \underline{\hspace{2cm}}$$

$$e^{\left(\frac{\ln 5}{2}\right)} = \underline{\hspace{2cm}}$$

b) (2 marks) Solve for  $x$ :  $5e^{(4-x)} = 15$

c) (2 marks) Solve for  $x$ :  $\log(x + 2) = 1 + \log(x - 2)$

**HINT:** *Using transformations to make a rough sketch of the graph of  $f(x)$  may be helpful for answering the following questions. The graph will not be marked.*

5. For the function defined by:  $f(x) = -\log_2(x + 3)$

a) (1 mark) Give the domain of  $f$  in interval notation. \_\_\_\_\_

b) (2 marks) Evaluate:  $f(-1) =$  \_\_\_\_\_  $f(5) =$  \_\_\_\_\_

c) (1 mark) Solve:  $f(x) = 2$

d) (1 mark) Solve:  $f(x) > 0$