Матн 1071	Exam 1 (make up)	Fall 2016		
Name:				
Instructor Name:		Section:		

# Read This First!

- Please read each question carefully. Show **ALL** work clearly in the space provided. In order to receive full credit on a problem, solution methods must be complete, logical and understandable.
- Answers must be clearly labeled in the spaces provided after each question. Please cross out or fully erase any work that you do not want graded. The point value of each question is indicated after its statement. No books or other references are permitted.
- Calculators are allowed, however models TI-89 and above are not permitted.

Grading - For Administrative Use Only

Page:	1	2	3	4	5	6	7	Total
Points:	16	16	12	14	14	16	12	100
Score:								

[6]

1. Second National Bank offers an account that earns 5% per year, compounded monthly. If a person invests \$20,000 in this account, what will be the value of the account at the end of 10 years?

- 2. Simplify the following to a form that does not contain radicals or negative exponents.
  - (a)  $\left(\frac{2x^{-2}y^7}{x^{-5}y^{-2}}\right)^3$

 $\log_2(8^3) \tag{4}$ 

3. Find the domain of the following functions:

(a) 
$$f(x) = \frac{x+2}{x(x^2+x-2)}$$
 [4]

(b) 
$$f(x) = \frac{1}{\sqrt{x+4}}$$

4. Evaluate the expression  $\frac{f(a+h)-f(a)}{h}$  given that  $f(x)=\frac{1}{3x+2}$  and simplify as much as [8] possible.

5. (a) The manufacturers are willing to supply 200 of these products when the price is set at \$50. If the price is increased by \$5, the manufacturers have agreed to supply 40 more. Find the linear supply equation for this product.

the [6]

[6]

(b) The demand equation for a particular product is known to be p = -x + 79. Find the equilibrium point using the demand equation and the supply equation you found in part (a).

[4]

[4]

[6]

6. Given the function  $f(x) = -\frac{4}{4-x}$ 

$$\lim_{x \to 4^-} f(x)$$

$$\lim_{x \to 4^+} f(x)$$

$$\lim_{x \to 3} \frac{x^2 - 2x - 3}{x^2 - 8x + 15}$$

[3]

[5]

8. The revenue and cost functions for a product are given below. The revenue and cost are given in dollars and x represents the number of units.

Revenue: 
$$R(x) = -4x^2 + 24x$$

Cost: 
$$C(x) = 12x + 8$$

(a) What is the profit function, P(x)?

(b) At what production level(s) will the company break even? [6]

(c) Find the value of x that maximizes the revenue.

9. In the following problems, solve for x. Give an exact answer.

(a) 
$$\ln(x) = 3\ln(2) - \ln(10) + \ln(5)$$

[6]

(b) 
$$9^x 27^{5x-2} = 1$$

[6]

(c) 
$$6 \cdot (11^x) - 3 = 15$$

[4]

[8]

[4]

10. In interval notation, state the values of x for which the function f(x) below is continuous.

$$f(x) = \begin{cases} x^3 & \text{if } x < -1, \\ x & \text{if } -1 \le x < 9, \\ 2x - 7 & \text{if } x \ge 9 \end{cases}$$

11. Solve the following inequality, and write your answer in interval notation.

$$2 \le 9 - 7x < 23$$

## FORMULA SHEET, EXAM 1

#### LINES

Equation of a line through the point  $(x_1, y_1)$  with slope m:

$$y - y_1 = m(x - x_1)$$

Formulas for a quadratic function,  $f(x) = ax^2 + bx + c$ :

Quadratic Equation:

$$f(x) = 0$$
 if and only if  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ 

Coordinates of the vertex of a parabola:

$$x = \frac{-b}{2a}, \qquad y = c - \frac{b^2}{4a}$$

### MATHEMATICAL MODELS

Compounding Interest m times a year.

Future Value, 
$$F = P(1+i)^n = P\left(1 + \frac{r}{m}\right)^{mt}$$
,

Present Value,  $P = \frac{F}{\left(1 + \frac{r}{m}\right)^{mt}}$ ,

Continuously compounding interest:

Future Value, 
$$F = Pe^{rt}$$
,  
Present Value,  $P = Fe^{-rt}$ ,

### Logarithms

Properties of Logs:

$$a^{\log_a(x)} = x$$
$$\log_a(a^x) = x$$
$$\log_a(xy) = \log_a(x) + \log_a(y)$$
$$\log_a(x/y) = \log_a(x) - \log_a(y)$$
$$\log_a(x^c) = c \log_a(x)$$