

Final

May 20, 2008.

Instruction:

- Put your name on top of this page.
- Make sure you have the total of 10 pages, numbered from 1 to 10.
- You are not allowed to use your textbook, notebook, graphing calculator, cellphone, or iphone. Two 3×5 inch index card are allowed along with a scientific calculator.
- Read all the questions carefully before you answer them; point values vary.
- Show all your works. Remember, if I cannot tell how you arrived at your answers, you will not receive partial credit and you may not get full credit even if your answer is correct.
- Circle or place a box around your final answers.
- You are expected to follow the university's code of conduct. That means no cheating and you are not allowed to discuss this test outside of the class.
- You have 2.5 hours to finish the exam.
- Good luck!

<i>Problem</i>	<i>Score</i>
[1]	
[2]	
[3]	
[4]	
[5]	
[6]	
[7]	
[8]	
9	
10	
11	
12	
13	
14	
15	
16	
<i>EC</i>	
<i>Total</i>	

* Questions with number in [] are MSLO driven.

(1)

2008 Spring	Math 70.22	[1]	Score (0-10)	
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If a town starts with a population of 20,500 that increases by 500 people each year.

(a) Construct an equation to model the population over time.

(b) How long would it take for the the population to double?

(2) (5 points each) Solve the following system of equations using substitution or elimination.

2008 Spring	Math 70.22	[2]	Score (0-10)	
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(a) $y = 3x + 2$
 $x + 3y = 11$

(b) $3y = 12$
 $x + 2y = 11$

(3)

2008 Spring	Math 70.22	[3]	Score (0-10)	
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Graph the parabola whose vertex is at $(1,-3)$ and passes through the point $(-1,1)$. Next, determine the equation of this parabola.

(4)

2008 Spring	Math 70.22	[4]	Score (0-10)	
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Complete the following table (show your work below).

	Initial Value	Growth or Decay	Factor	Rate	Equation
a)	84		1.06		
b)	7	Decay		29%	

(5)

2008 Spring	Math 70.22	[5]	Score (0-10)	
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Logarithms can be constructed using any positive number except 1 as a base:

$$\log_a x = y \text{ means that } a^y = x$$

Complete the accompanying table and sketch the graph of $y = \log_3 x$.

Table

x	$y = \log_3 x$
$\frac{1}{9}$	
$\frac{1}{3}$	
1	
3	
9	
27	

Graph

(6)

2008 Spring	Math 70.22	[6]	Score (0-10)	
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Solve for the given variable.

(a) $-2 \log 2 + \log x = -3$

(b) $244 = 61 \cdot 5^t$

(7)

2008 Spring	Math 70.22	[7]	Score (0-10)	
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Solve for the given variable.

(c) $3(2^t) = 21$

(d) $200 = 10(1.4)^t$

(8) (10 Points total)

2008 Spring	Math 70.22	[8]	Score (0-10)	
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Complete the following table, show your work below.

	Equation	Vertex	Concave up/down	Focal Coordinate	X-Intercepts
a)	$f(x) = -(x + 3)^2 + 2$				
b)	$g(x) = -x^2 + 10x + 24$				

- (9) **(10 points)** Create a function based on the given conditions with y-intercept (0,100).
- (a) The function increases by 12% each year.
 - (b) The function decreases at a constant rate of 12 each year.

- (10) **(5 points each)** Find an equation of the line that passes through the point (2, 2) and:
- (a) Parallel to $2x - y = 3$, and passes through $(-3, 2)$.

(b) Has slope equal to 12, and passes through (0, 0).

(c) Passes through two points: $(-1, 0)$ and $(5, 2)$.

(d) Is a vertical line that passes through $(12, 3)$.

(11) **(15 points)** Kyle invested \$400 in Freeman Savings Bank at an interest rate of 10% per year compounded quarterly.

(a) What is the nominal interest rate?

(b) What is the effective interest rate?

(c) How many years would it take for the account to have more than \$600?

(12) **(10 points total)** In 2001 the city's hotel workers union negotiated a salary increase for each year of service at a steady rate. If Eric, a hotel worker earned \$30,000 in that year and \$38,000 in 2007:

(a) What function would describe Eric's salary over time?

(b) In what year will Eric make \$50,000?

- (13) **(15 Points)** Simplify the following expressions. Write your final answers with only positive exponents.

(a) $\frac{a^{-1}b}{b^{-3}c^2}$

(b) $\frac{2x^{-2}y^2}{x^{-1}y^5} \cdot \frac{4x^4}{y^2}$

(c) $\sqrt{\frac{a^3b^4}{c^6}} \cdot \frac{c^{-2}\sqrt{a}}{b^0}$

- (14) **(10 Points)** Simplify the following expression using only the definitions of exponents

$$\left(\frac{2a^2b^3}{ab^4}\right)^{-2}$$

(15) **(20 Points)** In each part graph a parabola with the following characteristics:

(a) Concave down, with two x-intercepts and a positive y-intercept.

(b) Same concavity as $f(x) = -3x^2$ with a vertex at (5,3).

(c) Concave up, with the an axis of symmetry $x = 2$, and one x-intercept.

(d) Concave up, with focal point at $(-2, .5)$.

(16) **(20 Points)** State the type of equation (linear, exponential, quadratic, neither) and explain why.

(a) $y = 3x^2 + 4x + 5$

(b) $f(x) = 5 + 4x$

(c) $g(t) = 33 \cdot 4^t$

(d) $P = \log_3(x)$

Extra Credit:

- (1) **(10 points)** Generate a quick sketch of the following functions; besides the y-intercept you do not need to put specific values on your graph, just the x and y axes.

$$f(x) = 3(1.7)^x, \quad h(x) = 3(0.6)^x$$

$$g(x) = 3 - 3x, \quad j(x) = 3(7.2)^x$$

- (a) As $x \rightarrow -\infty$, which function(s) approach $+\infty$?
- (b) As $x \rightarrow -\infty$, which function(s) approach 0?
- (c) Are there any horizontal asymptotes?
- (d) Which function increases the fastest and why?

- (2) **(10 points)** What have you learned this semester?