

Practice Final

Math 1050 001 Summer 2013
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Jul 29th 2013

Name and Unid:

by writing my name I swear by the honor code

Read all of the following information before starting the exam:

- Show all work, clearly and in order, if you want to get full credit. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).
- Justify your answers algebraically whenever possible to ensure full credit. Sketch all relevant graphs and explain all relevant mathematics.
- Circle or otherwise indicate your final answers.
- You MAY NOT use a calculator or notes. You may use the formulas provided.
- This test has 10 problems and one bonus problem and is worth 100 points, plus some extra credit at the end. It is your responsibility to make sure that you have all of the pages!
- Good luck!

Good Luck!

Here are some formulas to help you along:

Properties of Logarithms

$$\text{Log}(AB) = \text{Log}(A) + \text{Log}(B)$$

$$\text{Log}\left(\frac{A}{B}\right) = \text{Log}(A) - \text{Log}(B)$$

$$\text{Log}(A^n) = n\text{Log}(A)$$

Compound Interest:

$$A = P_o \left(1 + \frac{r}{n}\right)^{nt}$$

Where A is the amount in the account after t years, r the interest rate as a decimal, P_o the initial investment and n the number of times per year interest is compounded.

Exponential Models

$$P = P_o e^{rt}$$

where P is the population after a time t , P_o the initial population, r the growth rate and $e = 2.718281828459045235360287471352662497757\dots$

Inverse of a 2X2 matrix

If

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

Then

$$A^{-1} = \frac{1}{ad - bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

1. (15 points)

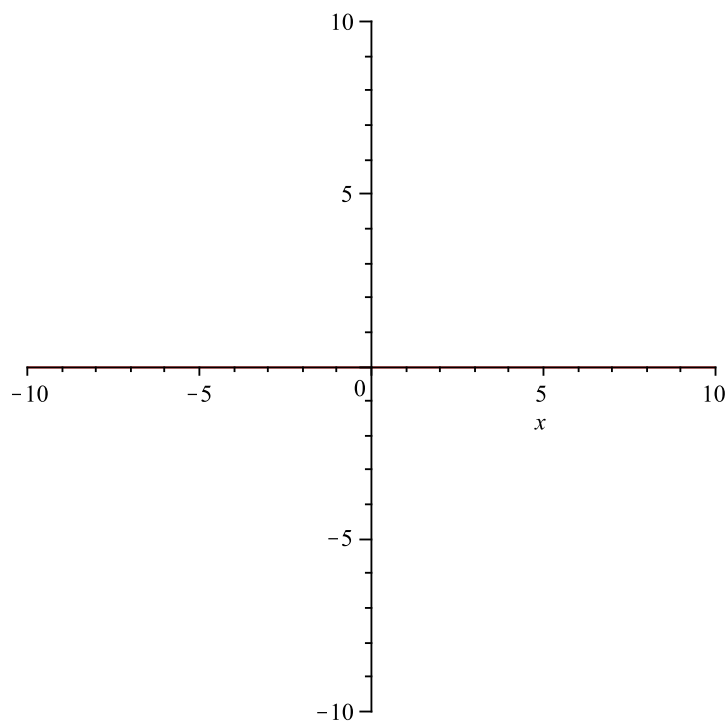
a. (5 pts) Find the midpoint between the points $(1, 4)$ and $(5, 4)$

b. (10 pts) Find the point on the y-axis that is equidistant between the points $(1, 4)$ and $(5, 4)$

2. (15 points)

a. (5 pts) Find the slope of the line going through the points $(-1, 2)$ and $(4, 5)$

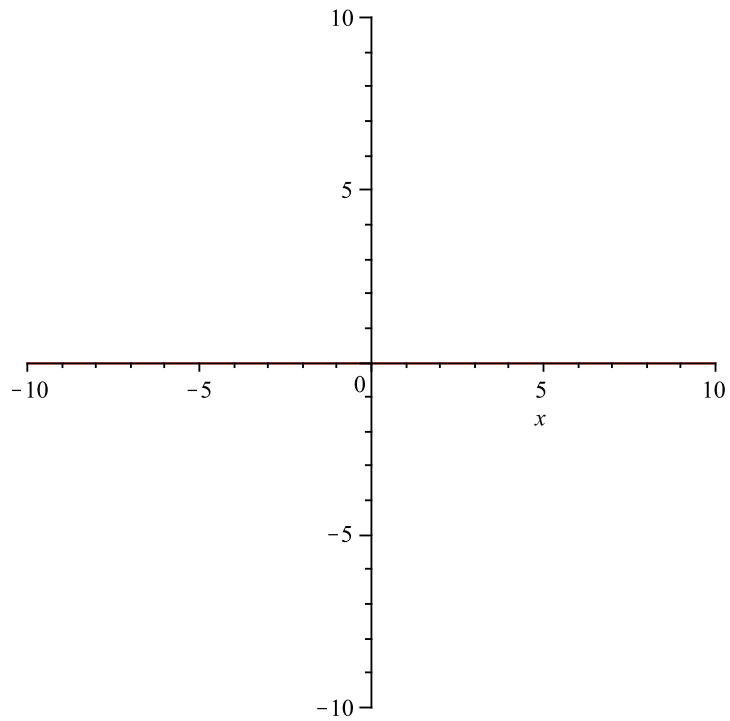
b. (10 pts) Find the equation of the line perpendicular to the line $y = -2x + 4$ going through $(0, 2)$ Sketch both lines below:



3. (15 points)

a. (5 pts) For the parent function $f(x) = |x|$ find the equation that results from a reflection over the x-axis a shift to the right 3 and down 4

b. (10 pts) Sketch the graph of $f(x) = -3(x + 4) + 12$ Include the x and y intercepts as points on your graph. Label the vertex. What is the maximum value of $f(x)$



4. (15 points)

a. (5 pts) Write the equation of a circle centered at $(-2, 3)$ with radius 4.

b. (10 pts) Write the quadratic equation $2x^2 + 4x - 8$ in standard form

- 5.** (*20 points*) For the polynomial $f(x) = 2x^3 + 4x^2 - 2x - 4$
- a.** (*5 pts*) List all of the possible rational zeros of $f(x)$

- b.** (*5 pts*) How many possible numbers of positive roots are there?

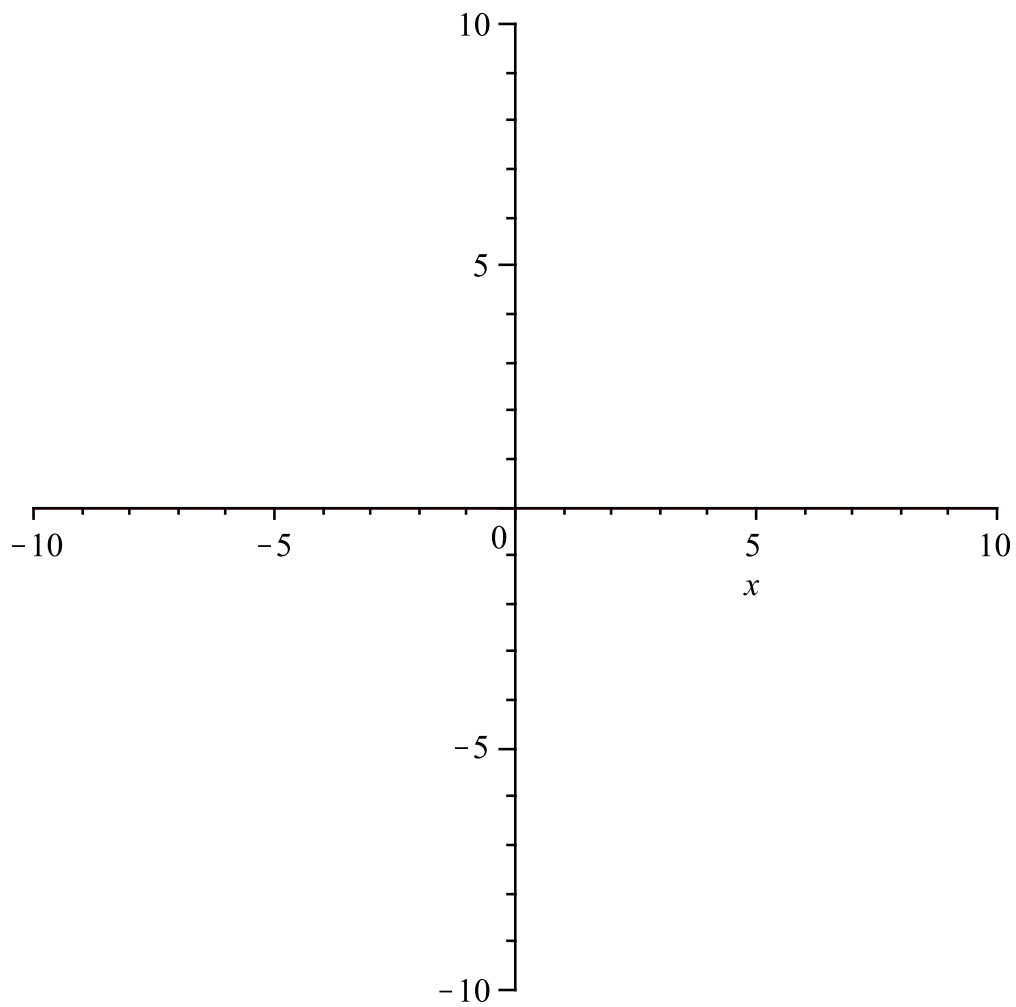
c. (5 pts) How many possible numbers of negative roots are there?

d. (5 pts) Find the zeros of $f(x)$ and write it as a product of its linear factors.

- 6.** (15 points) For the function $f(x) = \frac{2x^2-8}{x^2-9}$
- a.** (5 pts) Find all of the vertical and horizontal asymptotes if there are any.

- b.** (5 pts) Find the x and y intercepts if there are any.

c. (5 pts) Sketch the graph of $f(x)$. The space below the axes can be used to calculate any additional solution points or find out if the function crosses any horizontal asymptotes etc... to help you sketch the graph.



7. (*15 points*) Solve the following system of equations any way you like:

$$x + y + z = 2$$

$$3x + 2y + z = 4$$

$$2x + 4y - 2z = 8$$

8. (15 points)

a. (5 pts)

Does the following system have a solution? Determine the answer by taking the determinant of the coefficient matrix.

$$2x - 3y = 7$$

$$4x - 12y = 14$$

b. (10 pts) Solve the matrix equation by using the inverse of the coefficient matrix.

$$\begin{bmatrix} 2 & 3 \\ -4 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ -3 \end{bmatrix}$$

- 9.** (15 points) Let $A = \begin{bmatrix} 2 & 4 & -2 \\ 3 & -1 & 3 \\ 0 & 1 & -3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 4 & -1 \\ -3 & 2 & 10 \\ 5 & 1 & 5 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 0 & 2 \\ 2 & 2 & 5 \end{bmatrix}$
- a.** (5 pts) Calculate $2A-B$

- b.** (5 pts) Which is calculable CB or BC what is the size of the resulting matrix for the one that can be done?

c. (5 pts) Calculate CA

10. (15 points)

a. (10 pts) Take the determinant of $A = \begin{bmatrix} 0 & 1 & -1 \\ 4 & 2 & 1 \\ 0 & 3 & -3 \end{bmatrix}$

b. (5 pts) If the determinant of a matrix is zero what does that say about the inverse of that matrix?

11. (15 points)

a. (5 pts) If $f(x) = \sqrt{x-3} + 4$ find $f^{-1}(x)$

b. (5 pts) Given $f(x) = (x+2)^2 + 1$ verify that $f^{-1} = \sqrt{x-2} - 1$ by calculating $f(f^{-1})$ and $f^{-1}(f)$

c. (5 pts) Simplify using the inverse property: $4^{\log_4(x^2+3x+2)} - \log_3(3^{-x^2-3x+5})$

12. (15 points)

a. (5 pts) Calculate $\log_2\left(\frac{1}{32}\right)$

b. (5 pts) Solve $2\log_3(x+2) - \log_3(x+2) + \log_3(x+1) = 0$

c. (5 pts) Solve $e^{2x} + 3e^x + 1 = -1$

13. (15 points)

a. (5 pts) Find an expression for the n^{th} term of the sequence $1, -3, 9, -27, 81, \dots$

b. (5 pts) For the arithmetic sequence with $a_1 = 0$ and $d = -3$ find S_{210}

c. (5 pts) For the Geometric sequence with $a_1 = 2$ and $r = \frac{1}{2}$ find

$$\sum_{i=1}^{\infty} a_1 r^{i-1}$$

14. (*5 points*) (Bonus all or nothing) Using properties of logarithms and what you know about arithmetic series find:

$$\sum_{i=0}^{100} \ln(2^i)$$

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