

Practice Exam II

Math 1050 001 Summer 2013
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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!

1. (10 points)

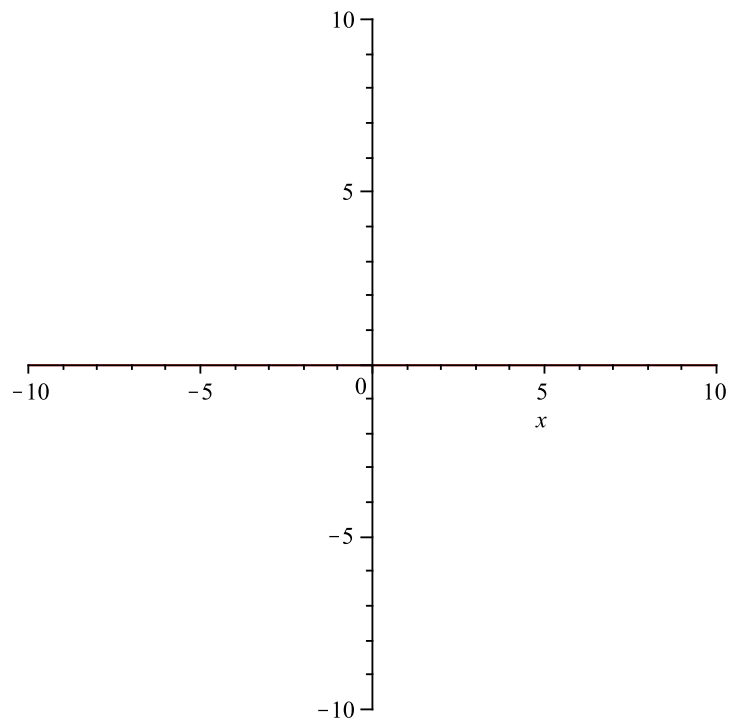
a. (5 pts) Solve $3^{x+2} = 27^{4x}$

b. (5 pts) Calculate $\log_9(\frac{1}{27})$

2. (10 points)

a. (5 pts) Solve $\log_3(x^2 + 2x + 1) - \log_3(x^2 - 1) + \log_3(x - 1) = 1$

- b. (5 pts) Sketch the graph of $\log_2(x - 1) + 2$



3. (10 points) Suppose you invest \$1000 into an account with an interest rate of $r = 5\%$ compounded monthly how long before you double your money. You can leave your answer in logarithmic form

4. (5 points) A certain bacteria doubles its population every 10 minutes. Using the $P = P_0 e^{rt}$ population model find the growth rate r

5. (5 points) Indicate whether the following systems of equations have a unique solution, no solution or infinitely many solutions but do not solve.

a. (3 pts)

$$x + 4y = 1$$

$$2x + 8y = 2$$

b. (2 pts)

$$x + 3y = 2$$

$$2x + 3y = 2$$

6. (*10 points*) Solve the following system of equations any way you like:

$$x + y + z = 6$$

$$3x + 2y + z = 10$$

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

7. (15 points)

a. (5 pts)

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

$$2x + 3y = 5$$

$$4x + 2y = 6$$

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

$$\begin{bmatrix} 2 & 3 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \end{bmatrix}$$

- 8.** (*20 points*) Let $A = \begin{bmatrix} 1 & 1 & -2 \\ 3 & -1 & 1 \\ 0 & 4 & -3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 & -1 \\ 4 & 2 & 10 \\ 5 & 1 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} 0 & 1 & -2 \\ 4 & 2 & 1 \end{bmatrix}$
- 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. (10 pts) Calculate CA

9. (10 points) Take the determinant of $A = \begin{bmatrix} 0 & 1 & -2 \\ 4 & 2 & 1 \\ 0 & 6 & -3 \end{bmatrix}$

10. (*5 points*)

Find the inverse of $A = \begin{bmatrix} 0 & 0 & 1 \\ 4 & 2 & 1 \\ 1 & 0 & 1 \end{bmatrix}$

11. (*5 points*) (Bonus all or nothing) Derive as we did in class the formula for the partial sum of a geometric sequence. That is that

$$\sum_{i=0}^n a^i = \frac{1 + r^{n+1}}{1 + r}$$

Explain what happens when $n \rightarrow \infty$ and $|r| < 1$.

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