

Exam 4

Ch 10, 11.1

Nov_15



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Honesty Pledge

On my honor, by printing and signing my name below, I vow to neither receive nor given any unauthorized assistance on this examination:

NAME (PRINT): _____ SIGNATURE: _____

Directions

- YOU ARE ALLOWED TO USE ONLY A SCIENTIFIC CALCULATOR ON THIS EXAM.
- You have 85 minutes to complete this exam.
- The exam totals **102 points**.
- There are 7 problems, many of them with multiple parts.
- Place all of your belongings in the front of the classroom and I will assign you a seat. Bring with you your writing utensils.
- Cell phones must be turned off and put away in with your items in the front of the classroom.
- Handwriting should be neat and legible. If I cannot read your writing, zero points will be given.
- Some questions contain multiple-parts which you must do individually and the parts are denoted by (a), (b), (c), etc. Some questions are multiple-choice and the choices are denoted with (A), (B), (C), (D), and (E). For True/False questions, you must spell out the entire word "true" or "false" in your answer.
- Make sure to ALWAYS SHOW YOUR WORK; you will not receive any partial credits unless work is clearly shown. *If in doubt, ask for clarification.*
- A problem which requires a **proof** means you must provide a general proof in complete sentences. Do not use logical short-hand in proofs.
- Leave answers in exact form (as simplified as possible), unless told otherwise.
- Put a

box around your final answer

 where applicable.
- **PLEASE CHECK YOUR WORK!!!**

Score	Grade

This page is intentionally blank. It may be used for scratch paper. If you wish for me to grade your work on this page, please (i) label the problem you are working on, (ii) box your answer, (iii) indicate in the original problem's location that you will continue your work on this page.

Problem 1: 20 pts (2 pts each)

Fill-in the blank: (No work needed)

- (a) Assume that the polynomial $Q(x) = ax^2 + bx + c$ is **irreducible**, then the equation $Q(x) = 0$ has _____ solutions.
- (b) A **non-linear system of equations** can have _____ solutions .
- (c) Write the **elementary row operation (ERO)** corresponding to “subtract 5 times row 3 from row 4 and put this into row 4”:
_____ .
- (d) An **inconsistent system of equations** has _____ solutions .
- (e) If the **solution set** of a non-linear system of inequalities can be enclosed in a sufficiently large circle, then we say it is _____ .

TRUE or FALSE (please spell out/write the entire word for credit). (No work needed)

- (a) _____ If $x = 3, y = 2, z = -1$ solve a **system of equations (SOE)**, then the SOE has 3 solutions.
- (b) _____ A **consistent** SOE has at least one solution.
- (c) _____ The reduced row-echelon form of the augmented matrix corresponding to a SOE doesn't need to have zeros above leading ones.
- (d) _____ The **size** or **dimension** of the matrix $\begin{bmatrix} 2 & 0 & -1 & 0 \\ 1 & 5 & 0 & -3 \end{bmatrix}$ is 8.
- (e) _____ The system of nonlinear equations $\begin{cases} x^2 + y^2 = 1 \\ x + y = -5 \end{cases}$ has no solutions.

Problem 2: 12 pts - 4 pts each

Write the form of the **partial fraction decompositions**: Please Note: **DO NOT SOLVE!**

(a) $\frac{2x + 1}{(x^2 + x)(x^2 - x - 2)} =$

(b) $\frac{x^2 + 5}{(x + 4)^2(x^2 + x + 1)} =$

(c) $\frac{x^3 - x - 1}{(x^2 + 5)^3(x^2 + 5x - 14)} =$

Problem 3: 16 pts - 8 pts each

Find the **partial fraction decompositions**. Please give **exact values!** You must show work/formulas used to receive full credit.

(a) $\frac{2x^2 - x + 3}{(x - 3)(x^2 - 1)} =$

(b) $\frac{3x^2 - x + 6}{(x^2 + 2)^2} =$

Problem 4: 8 pts – 4 pts each

Solve the following. Please give **exact values!** You must show work/formulas used to receive full credit.

(a) Find the **augmented matrix** corresponding to:

$$\begin{cases} x - 3y + 2z + w &= -2 \\ x - 2y - 2w &= -10 \\ z + 5w &= 15 \\ 3x + 2z + w &= -3 \end{cases}$$

(b) Perform the following EROs:

(1) $(1/2)R_1 \rightarrow R_1$ and then (2) $R_2 - 3R_1 \rightarrow R_2$.

$$\left[\begin{array}{ccc|c} 2 & 6 & -8 & 24 \\ 3 & -2 & 1 & 3 \\ 5 & 0 & 4 & 5 \end{array} \right]$$

Problem 5: 28 pts - (6-6-8-8)

Solve the following **systems of equations**. Give **exact values**!

- (a) Solve by **graphing**: $\begin{cases} y = -x^2 + 1 \\ x^2 + y^2 = 4 \end{cases}$. Determine the solutions by graphing and label them. However, you do not need to find the exact coordinates.

- (b) Solve using **substitution**: $\begin{cases} x^2 + 4y^2 = 4 \\ x + 2y = 2 \end{cases}$. Give answer as a **solution set**.

Solve the following **systems of inequalities**. Give **exact values**!

- (c) $\begin{cases} x + y \geq 2 \\ y - x \leq 2 \\ x \leq 3 \end{cases}$. **Sketch** the **solution set** by graphing the boundary curves and shading the region. Be sure to indicate and label vertices, if any. Is the region bounded or unbounded?

- (d) $\begin{cases} y \leq -(x - 2)^2 + 4 \\ x + y > 4 \end{cases}$. **Sketch** the **solution set** by graphing the boundary curves and shading the region. Be sure to indicate and label vertices, if any. Is the region bounded or unbounded?

Problem 6: 12 pts

Solve the system of equations using Gaussian Elimination (or Gauss-Jordan Reduction) by **row-reduction**. You must indicate all your ERO's used. You must use row-reduction, no other method will receive credit.

$$\begin{cases} x - 2y + z = 5 \\ x + y + 3z = 8 \\ y + 2z = 5 \end{cases}$$

Problem 7: 6 pts

Solve the system of equations using the information provided. Be sure to give your answer as a **solution set** using set notation and matrix notation.

$$\begin{cases} x + 3y - 4z + 4w = 4 \\ x + 4y - 7z + 6w = 3 \\ -2x - 6y + 8z - 8w = -8 \\ 5x + 20y - 35z + 30w = 15 \end{cases} \quad \text{with} \quad \left[\begin{array}{cccc|c} 1 & 3 & -4 & 4 & 4 \\ 1 & 4 & -7 & 6 & 3 \\ -2 & -6 & 8 & -8 & -8 \\ 5 & 20 & -35 & 30 & 15 \end{array} \right] \quad \text{with RREF} \quad \left[\begin{array}{cccc|c} 1 & 0 & 5 & -2 & 7 \\ 0 & 1 & -3 & 2 & -1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right]$$

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Now that you have finished the exam, please take a few minutes to reflect on how you prepared for the exam and how you think you did. Then answer these questions.

1. When taking the exam I felt
 - (a) Rushed. I wanted more time.
 - (b) Relaxed. I had enough time.
 - (c) Amazed. I had tons of extra time.
2. The week before the test I did all my homework on time: YES NO
3. The week before the test, in addition to the homework I followed a study plan. YES NO
 - (a) I think this helped: YES NO
4. The day before the test I spend _____ hours studying and reviewing.
 - (a) I think that was enough time: YES NO
5. The night before the test:
 - (a) I stayed up very late cramming for the test
 - (b) I stayed up very late, but I wasn't doing math
 - (c) I didn't need to cram because I was prepared
 - (d) I got a good night's sleep so my brain would function well.
6. I think I got the following grade on this test: _____
7. Strategies that worked well for me were (please elaborate):
8. Next time I will do an even better job preparing for the test by: