MATH 1530 Fall 2016
Exam 4

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DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO

- Write your name below on the space provided.
- This test has a total of 6 pages.
- Work the problem in the space provided. If you need more space, write on the back of the test.
- To insure maximum credit, show your work. In general, full credit will not be given for unsupported answers.
- Look only at your test. Don't give me the impression that you are cheating.
- Draw a turkey on this page for something extra.
- Be sure to write neatly. If I cannot read what was written, do not expect the problem to be graded. A pencil must be used on all tests. Otherwise, the test will not be graded.
- If you finish early, go over the test again.

Good luck!

Number	Maximum	Score
1	10	
2	3	
3	20	
4	16	
5	5	
6	18	
7	8	
8	8	
9	12	
Total	100	

Name _____

1) (10 points) Solve the system $\begin{cases} 3x-y=2 \\ x-2y+2z=-2 \\ 2x-3y+3z=-1 \end{cases}$ using matrix inverses. Be sure the work necessary to obtain the inverse.

2) (3 points) Prove that the matrix $\begin{bmatrix} 4 & 0 \\ 3 & 0 \end{bmatrix}$ has no inverse. Hint: Assume $\begin{bmatrix} a & c \\ b & d \end{bmatrix}$ is the inverse and show that this assumption leads to a contradiction.

3) (10 points each) Decompose into partial fractions:

a) $\dfrac{x+10}{x^2-4x-12}$

b) $\dfrac{x^2+2x+7}{\left(x^2+2\right)(x+1)}$

4) (8 points each) Fill in the information for the following parabolas:

a) $y^2 = 36x$:

i) h = _____

ii) k = _____

iii) p = _____

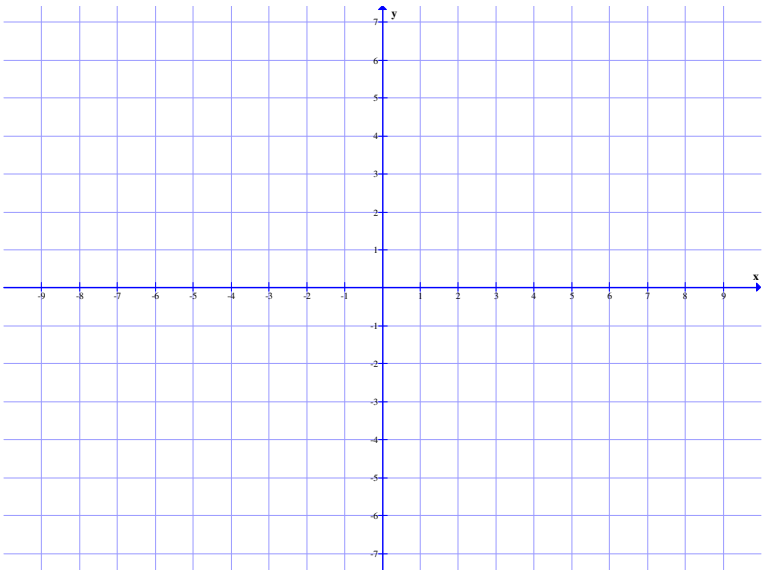
Write iv and v as ordered pairs:

iv) Center _____

v) Focus _____

vi) Directrix _____

vii) Sketch the graph:



b) $(y-2)^2 = -12(x+1)$:

i) h = _____

ii) k = _____

iii) p = _____

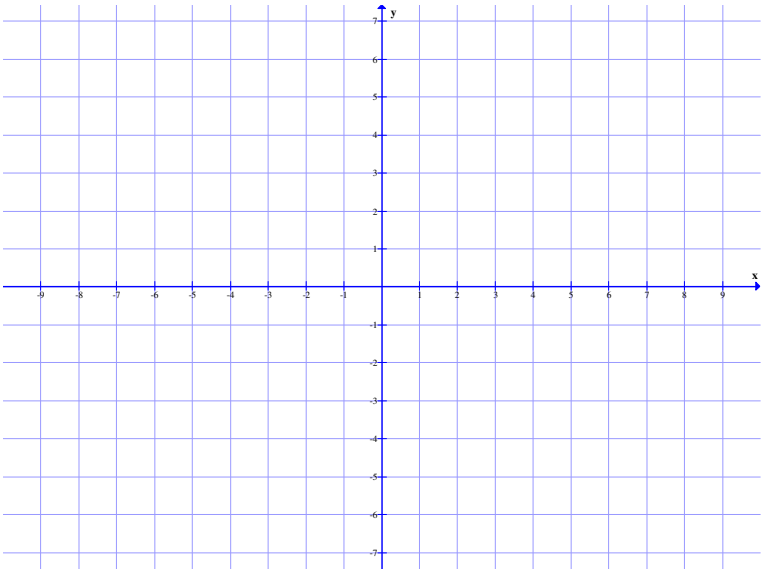
Write iv and v as ordered pairs:

iv) Center _____

v) Focus _____

vi) Directrix _____

vi) Sketch the graph:



5) (5 points) Determine the location of the receiver for a 30 foot tall, 6 foot deep parabolic satellite dish assuming the receiver is to be at installed at the foci of the parabola. Give your answer in feet from the vertex of the dish:

6) (6 points each) For the ellipse $25x^2 - 100x + 16y^2 + 96y + 244 = 400$

a) Rewrite the equation by completing the square for both variables:

b) Find the **exact values** for the following:

i) h = _____

ii) k = _____

iii) a = _____

iv) b = _____

v) c = _____

Write as ordered pairs:

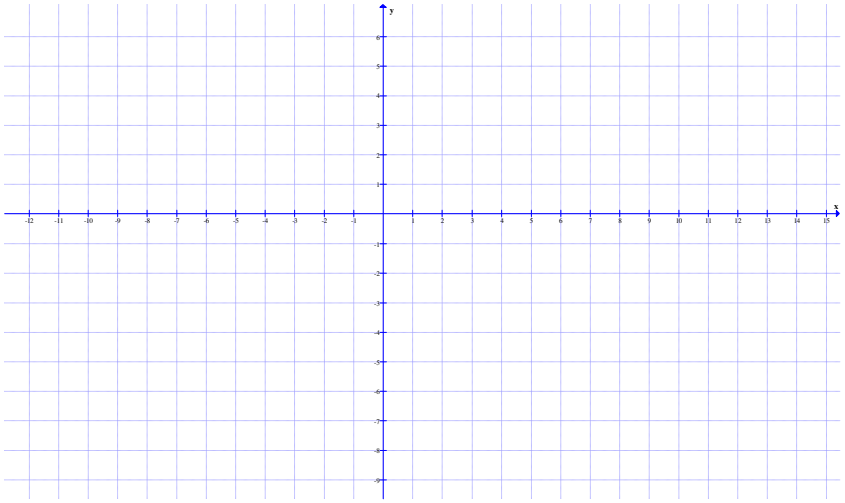
vi) Center _____

vii) Vertices _____

viii) Co-Vertices _____

ix) Foci _____

c) Sketch the graph:



7) (4 points each) Statuary Hall, also known as the Whispering Gallery, is an elliptical room in the United States Capitol in Washington D.C. where a person standing at one focus of the room can hear even a whisper spoken by a person standing at the other focus. Statuary Hall is 46 feet wide and 97 feet long. Assuming a horizontal ellipse, find…

a) The equation of the ellipse for the room:

b) The location of the foci from the center of the room. Round to two decimal places:

8) (8 points) Fill in the information for the hyperbola $\frac{(x-2)^2}{9}-\frac{(y+1)^2}{16}=1$:

i) h = _____

ii) k = _____

iii) a = _____

iv) b = _____

v) c = _____

Write as ordered pairs:

vi) Center _____

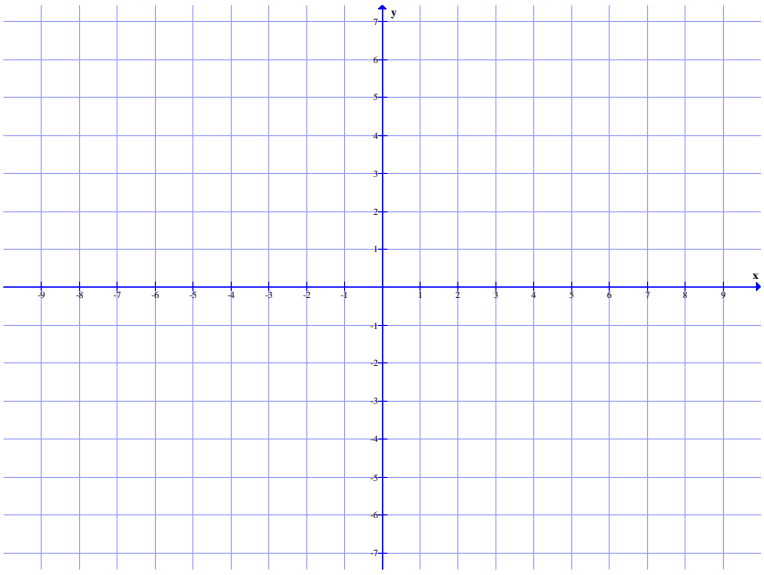
vii) Vertices _____

viii) Co-Vertices _____

ix) Foci _____

x) Asymptotes _____

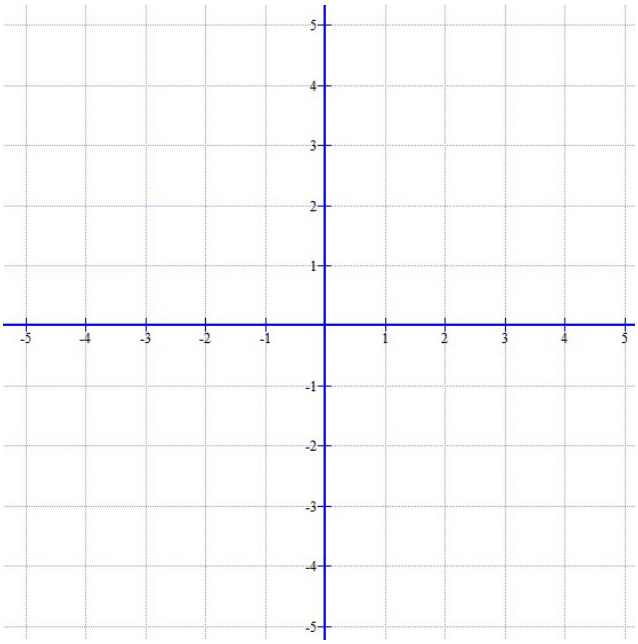
vi) Sketch the graph:



9) (6 points each) Solve the following systems. For part *b*, shade your final in the darkest:

a) $\begin{cases}(x-3)^2+(y+1)^2=16\\ x+3y=4\end{cases}$

b) $\begin{cases}x^2+y^2\le 16\\ \frac{y^2}{9}-\frac{x^2}{4}\le 1\end{cases}$



Formulas

Parabola

Vertical: $x^2 = 4py$ $\quad (x-h)^2 = 4p(y-k)$

Horizontal: $y^2 = 4px$ $\quad (y-k)^2 = 4p(x-h)$

Ellipse

Horizontal: $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ $\quad \frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$

Vertical: $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$ $\quad \frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$

Foci: $a^2 - b^2 = c^2$

Hyperbola

Horizontal: $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ $\quad \frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$

Vertical: $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$ $\quad \frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$

Foci: $a^2 + b^2 = c^2$