MAT 1340 Week 14 Written Assignment
30 pts Covers Sections 4.1 – 4.5

5.3 - Partial Fractions
5.4 - Systems of Nonlinear Equations
5.5 - Systems of Inequalities
7.1 – Parabolas
7.2 – Ellipses
7.3 – Hyperbolas
7.4 – Shifting Conic Sections (Optional)
8.5 – The Binomial Theorem (Pascal's Triangle)
9.1 – Permutations and Combinations

1. Find the partial fraction decomposition.

   a. (5 pts) $\dfrac{5x+1}{x^2-1}$

   b. (**Bonus** 5 pts) $\dfrac{x-8}{x^3+8x}$

2. (10 pts) Sketch the feasible region for the following system of inequalities.

   The WebAssign has you shade the good stuff. For these systems, you should shade the BAD stuff. That way, you can see the feasible region, because it's the CLEAN part of the picture, and it's always convex (meaning there are no harbors or peninsulas on the coastline.).

   If I were doing these on WebAssign, I'd shade the bad stuff on my paper, revealing the feasible region. Then on the WebAssign, that's the portion of the picture that I'd shade with one click.

   $$2x-7y \le 14$$
   $$3x+2y > 6$$
   $$x \le 7$$
   $$y \le 3$$

   Find and label all corner points.

3. Find the focal length p, the equation of the directrix, and the focal diameter of the given parabola. Then sketch the graph. Show the focus, vertex, and directrix. Locate and label the ends of the *latus rectum* for each, and show the *latus rectum*, itself.

   Don't waste time on tickmarks or precision. Get the shape right and the general location of things.

   Don't use a calculator for anything but a better idea of where things are. A far as the points shown on the graph, I expect *exact* figures. If in doubt as to what I mean, see solutions. You can cheat me of the points on this assignment, but if you don't learn how to do the stuff, I'll get you back on the Final.

a. (5 pts) $y = \frac{1}{12}x^2$

b. (5 pts) $x = -\frac{1}{20}y^2$

c. (**Bonus** 5 pts) $y = \frac{1}{8}x^2 - \frac{5}{4}x - \frac{71}{8}$

d. (**Bonus** 5 pts) Add the *x*- and *y*-intercepts to your graph. Label them *P*, *Q*, and *R*, and add them to your list of points in your legend.

4. Graph the ellipse given by the equation. Label the center, foci, and the endpoints of the major and minor axes. I encourage you to use "the box" in which the ellipse fits.

a. (5 pts) $\frac{x^2}{100} + \frac{y^2}{64} = 1$

b. (**Bonus** 5 pts) $49x^2 + 25y^2 + 196x - 150y - 804 = 0$

5. Graph the hyperbola given by the equation. Label the center, foci, and vertices. I encourage you to use "the box" to help sketch the asymptotes. Again, I'm not looking for tickmarks (How many times must I say it before everyone gets it?). I'm looking for the general shape and location, with labels clearly marked on the same key points for which I always ask.

a. (**Bonus** 5 pts) $\frac{y^2}{64} - \frac{x^2}{100} = 1$

b. (**Bonus** 5 pts) $25x^2 - 36y^2 - 150x - 144y - 819 = 0$

6. Use Pascal's Triangle or the Binomial Coefficient for the following:

a. (**Bonus** 5 pts) Use Pascal's triangle to expand the following product $(3x - 2y)^4$

b. (**Bonus** 5 pts) What is the coefficient of x^9 in the product $(2x - 3y)^{16}$?

7. (**Bonus** 5 pts) How many ways can you pick a starting lineup consisting of a point guard, shooting guard, small forward, power forward, and center, from a roster of 15 players?

8. (**Bonus** 5 pts) How many ways can you pick 4 volunteers out of a group of 10 volunteers?