

# QUIZ ON CHAPTER 12

MATH 151 – SPRING 2003 – KUNIYUKI  
100 POINTS TOTAL

**Show all work, simplify as appropriate, and use “good form and procedure” (as in class).  
Box in your final answers!**

**No notes or books allowed. A scientific calculator is allowed.**

You may use mixed numbers instead of improper fractions in your answers.  
Don't approximate.

- 1) Consider the equation  $x + 6y^2 - 48y + 93 = 0$ . Its graph is a parabola in the standard  $xy$ -plane. (Show your work at the bottom of the page.) (13 points total)
  - a) Which way does the parabola open (down, left, right, or up)?
  - b) What are the coordinates of the vertex of the parabola?
  - c) What are the coordinates of the focus of the parabola?

2) Consider the equation  $3x^2 + 2y^2 + 18x - 4y + 17 = 0$ . Its graph is an ellipse in the standard  $xy$ -plane. (Show your work at the bottom of the page.)  
(24 points total)

a) What are the coordinates of the vertices of the ellipse?

b) What are the coordinates of the foci of the ellipse?

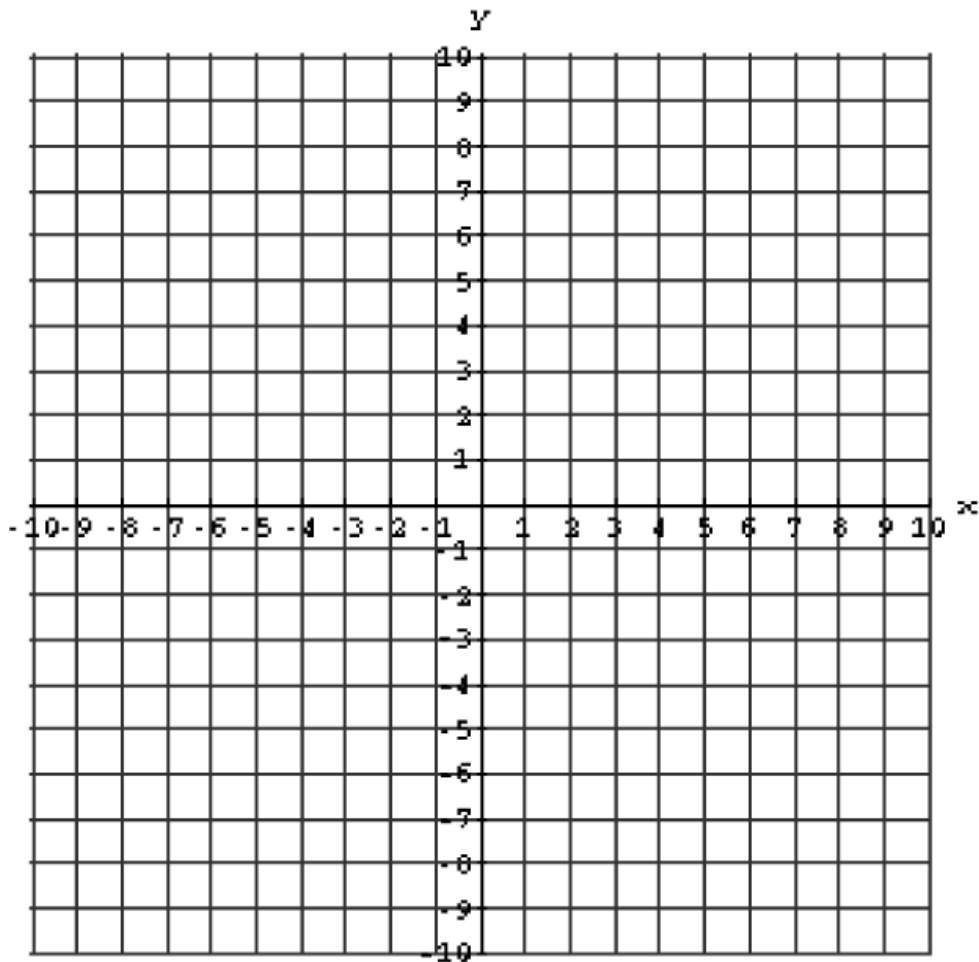
c) What is the eccentricity of the ellipse?

3) Consider the equation  $\frac{(y-3)^2}{9} - \frac{(x+2)^2}{25} = 1$ . Its graph is a hyperbola in the standard  $xy$ -plane. (17 points total)

a) What are the coordinates of the foci of the hyperbola?

b) What are the equations of the asymptotes of the hyperbola?

c) Sketch the graph of the hyperbola using the coordinate grid below. Make sure you accurately plot/graph the center, the vertices, and the asymptotes of the hyperbola.



4) Find an equation of the parabola that has vertex  $(7, -2)$  and focus  $(7, 1)$ .  
(8 points)

5) Find an equation of the hyperbola that has vertices  $(\pm 4, 0)$  and foci  $(\pm 7, 0)$ .  
(10 points)

6) A particular rotated conic section has equation  
 $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$ , for particular values of  $A, B, \dots, F$ .  
If  $B^2 - 4AC = -6$ , what type of conic do we have – an ellipse, a hyperbola, or a parabola? (3 points)

- 7) The graph of  $5x^2 - 2\sqrt{3}xy + 7y^2 - 24 = 0$  is a rotated ellipse. Use a suitable rotation of axes to find an equation for the graph in an  $x'y'$ -plane such that the equation has no cross-term. Your final equation must be in standard form for an ellipse. Also give the angle of rotation. You do not have to graph anything. (25 points total)