1. Identify as a circle, line, parabola, ellipse, hyperbola, or none of the above

   a) \( 2x = y^2 + 2 \)  
   b) \( x^2 = y^2 + 9 \)  
   c) \( x^2 + 2x + 3y^2 = 2y + 2 \)  
   d) \( (x - 2)^2 + (y - 2)^2 + 3 = 0 \)  
   e) \( xy = 3 \)  
   f) \( (x - 2)^2 - (y - 2)^2 + 3 = 0 \)  

2. Find the domain of

   a) \( y^2 = 2(x - 2) \)  
   b) \( x^2 + 3y^2 = 9 \)  
   c) \( (x + 2)^2 - (y - 3)^2 = 1 \)  
   d) \( f(x) = \frac{3}{x^2 + 9} \)  

3. Find the range of

   a) \( (x - 2)^2 = 2(y + 3) \)  
   b) \( x^2 + (y - 2)^2 = 4 \)  
   c) \( y^2 - x^2 = 4 \)  
   d) \( f(x) = \frac{e^x + e^{-x}}{2} \)
4. Give a rough but accurate sketch of (without the use of a calculator)

a) \( y = (x + 2)^2 + 3 \) 

b) \( x^2 - (y + 2)^2 = 4 \)

c) \( \frac{(x + 2)^2}{9} + \frac{(y - 3)^2}{16} = 1 \) 

d) \( 2x + y = 3 \)

5. Write in standard form.

a) \( x^2 + 8x - 2y - 6 = 0 \) 

b) \( x^2 + 4y^2 - 16y + 4 = 0 \)

6. Write down the translation formulas
7. Find the new coordinates \((x', y')\) if the origin is translated to \((1, 2)\). Write down the formulas with the values substituted in and then find the actual values.

\((3, -2) \rightarrow \) ________

8. Find the new equation in terms of \(x'\) and \(y'\) if the origin is translated to \((1, 2)\). Simplify your solution.

a) \(2x + 3y = 1\)  
b) \((x + 2)^2 = -8y\)

9. Find the coordinates that the origin has to be moved to so that the new equation will be

a) free of all first degree terms – ________

\((x + 2)^2 = 2y^2 - 8y - 2\)

b) one first degree term and the constant term  
\(2y^2 + 12y = 2x - 6\)

10. Find the equation of the circle that

a) has its center at \((3, -2)\) and is tangent to the line \(4x + 3y = 1\)

b) tangent to the line \(2x + y = 3\) at the point \((3, -3)\) and has its center on the x-axis.

c) explain how to find the equation of a circle inscribed in a triangle formed by the intersection of three known lines.

d) explain how to find the equation of a circle given three points that it passes through.
11. Find the equation of the parabola that
   a) focus at (3, 2) and vertex at (7, 2)

   b) latus rectum of length 8, vertex at (-2, 5), opening downward.

   c) directrix $x = -2$, vertex at (3, 2)

   d) passing through the point (-1, 0) and vertex at (2, 4)

   e) passing through three points; see notes or text for an example

12. Find the equation of the ellipse that
   a) has major axis of length 12 and parallel to x-axis, minor axis of length 8, center at (2, -3),

   b) endpoints of major axis at $V(3, 1)$ and $V'(3, -3)$, focus at $F(3, -2)$

   c) eccentricity $= 3/4$, foci at $F(-2, 5)$ and $F'(10, 5)$

   d) With minor axis of length 12 parallel to y-axis and the sum of distances from the fixed points to any point on the ellipse = 30 (assume center is at the origin)
13. Find the equation of the hyperbola that
   a) has transverse axis (major) perpendicular to x-axis and of length 12, endpoints of conjugate axis (minor) at B(2, -3) and B' (2, 7)
   b) Foci at F(3,1) and F'( -3, 1), a vertex at V(2, 1)
   c) asymptotes ; \( \frac{(x + 2)}{3} - \frac{(y - 3)}{2} = 0 \) and \( \frac{(x + 2)}{3} + \frac{(y - 3)}{2} = 0 \)

There are two possible answers; list both and explain why two answers.

14. Find the equation of the asymptotes of the hyperbola represented by
   \[ 4(y+3)^2 - 9(x-4)^2 = 36 \]

15. Find the eccentricity of the following ellipse.
   \[ 9(x+2)^2 + 25(y-3)^2 = 225 \]

16. Word problems. Parabola – cable suspended from two supports

17. Word Problems: parabola – projectile shot – path has the shape of a parabola

18. Word Problem: ellipse

19. Find the radical axis formed by the intersection of the following two circles.