

## Problem Set Week 10 and 11

### Circle

1. Find the equation of the circle with given centre and radius:
  - a. center (3,5), radius 3
  - b. center (-2,3), radius 1
  - c. center (-1,-3), radius 2
  - d. center (2,-2), radius 5
  - e. center (0,5), radius 4
2. Identify the centre and radius of the following circles:
  - f.  $x^2 + y^2 - 2x - 4y - 20 = 0$
  - g.  $x^2 + y^2 - 4x + 6y + 4 = 0$
  - h.  $x^2 + y^2 + 2x - 3 = 0$
  - i.  $x^2 + y^2 + 6x + 7y - 14.75 = 0$
  - j.  $3x^2 + 3y^2 - 6x + 9y + 5 = 0$
3. Find the equation of the tangent to each circle at the point specified.
  - k.  $x^2 + y^2 - 2x - 4y - 20 = 0$ , point (4,-2)
  - l.  $x^2 + y^2 + 4x + 2y - 20 = 0$ , point (1,3)
  - m.  $x^2 + y^2 - 6x + 4y - 87 = 0$ , point (-3,-10)
  - n.  $x^2 + y^2 + 18x - 88 = 0$ , point (3,5)
  - o.  $x^2 + y^2 - 6y - 160 = 0$ , point (12,8)
4. Find the points of intersection of the line  $y = 2x + 1$  and the circle  $x^2 + y^2 - 2y - 4 = 0$ . Show that the line  $y = 2x + 1$  is a diameter of a circle. Find the equation of the tangent to the circle at one of the points of intersection.
5. Find the points of intersection of the line  $y = x - 3$  and the circle  $x^2 + y^2 - 2x + 2y + 1 = 0$ . What are the tangents at the points of intersection? Where do they intersect?
6. Find the points where the circle  $x^2 + y^2 - 10x - 10y + 40 = 0$  and the line  $y + 2x = 10$  intersect. Find the equation of the tangent to the circle at each of the points of intersection. Find the point of intersection of these two tangents.

### Ellipse

1. Find the vertices and foci of the following ellipse:  $5x^2 + 7y^2 = 35$
2. Find the equation of the ellipse with a foci (4,0) and (-4,0), whose minor axis has a length of 6.
3. Find the center, foci and vertices of the following ellipse  $\frac{(x-3)^2}{16} + \frac{(y-5)^2}{9} = 1$ .
4. Find the equation of an ellipse with foci (-2,1) and (-2,5) and major-axis endpoints (-2,-1) and (-2,7)

5. Find the standard form of the equation of the ellipse having foci at (0,1) and (4,1) and a major axis of length 6.
6. Find the center, vertices and foci of the ellipse  $4x^2 + y^2 - 8x + 4y - 8 = 0$ .
7. Find the standard form of the equation of the ellipse that has a major axis of length 6 and foci of (-2,0) and (2,0) and center at the origin and graph.
- 8.

### Parabola

1. Find the equation of a parabola having the origin as its vertex, the y-axis as its axis and (-10,-5) on its graph.  
Find the coordinates of its focus and the equation of its directrix.

### Hyperbola

1. Find the standard equation form of the equation for a hyperbola with vertices at (0,-8) and (0,8) and asymptote  $y = 2x$
2. Find the center, vertices, length of the transverse axis, and equations of the asymptotes for the hyperbola  $\frac{(x+5)^2}{9} - \frac{(y-2)^2}{36} = 1$
3. Find the standard form of the equation for a hyperbola with focus (1,9), vertex (1,8), center (1,4).
4. Find the equation of the hyperbola with foci (5,2) and (-1,2) whose transverse axis is 4 units long.
5. Find the coordinates of the center, foci, and vertices and the equations of the asymptotes of the graph  $\frac{(y-2)^2}{64} - \frac{(x+1)^2}{36} = 1$ .
6. Find the coordinates of the center, foci and vertices and the equations of the asymptotes of the graph  $25x^2 - 16y^2 + 250x + 32y + 109 = 0$ . Then graph the equation.
7. Write the equation of the hyperbola with center at (2,1), a focus of (2,-3), and eccentricity of  $\frac{4}{3}$ .