1. The vector \( \mathbf{v} \) has initial point \( P \) and terminal point \( Q \). Write \( \mathbf{v} \) in the form \( a\mathbf{i} + b\mathbf{j} \). \( P = (0, 0); \ Q = (-3, -5) \)

2. The vector \( \mathbf{v} \) has initial point \( P \) and terminal point \( Q \). Write \( \mathbf{v} \) in the form \( a\mathbf{i} + b\mathbf{j} \). \( P = (-3, 2); \ Q = (6, 5) \)

3. Find \( ||\mathbf{v}|| \) if \( \mathbf{v} = -\mathbf{i} - \mathbf{j} \)

4. Find \( ||\mathbf{v}|| \) if \( \mathbf{v} = 6\mathbf{i} + 2\mathbf{j} \)

5. If \( \mathbf{v} = 3\mathbf{i} - 5\mathbf{j} \) and \( \mathbf{w} = -2\mathbf{i} + 3\mathbf{j} \), find \( 3\mathbf{v} - 2\mathbf{w} \)

6. If \( \mathbf{v} = 3\mathbf{i} - 5\mathbf{j} \) and \( \mathbf{w} = -2\mathbf{i} + 3\mathbf{j} \), find \( ||\mathbf{v} + \mathbf{w}|| \)

7. Find the unit vector in the same direction as \( \mathbf{v} \): \( \mathbf{v} = -5\mathbf{i} + 12\mathbf{j} \)

8. Write the vector \( \mathbf{v} \) in the form \( a\mathbf{i} + b\mathbf{j} \): \( ||\mathbf{v}|| = 3, \alpha = 240^\circ \)

9. Find the equation of the parabola described. Find the two points that define the latus rectum and graph the equation. Focus at \((-4, 0); \ vertex \ at \ (0, 0)\)

10. Find the equation of the parabola described. Find the two points that define the latus rectum and graph the equation. Focus at \((0, -1); \ directrix \ line \ y = 1\)

11. Find the vertex, focus, and directrix of the parabola: \( y^2 = 8x \)

12. Find the vertex, focus, and directrix of the parabola:
\[
(x + 4)^2 = 16(y + 2)
\]

13. A cable TV receiving dish is in the shape of a paraboloid of revolution. Find the location of the receiver, which is placed at the focus, if the dish is 6 feet across at its opening and 2 feet deep.
14. Find the vertices and foci and graph the ellipse: \( x^2 + \frac{y^2}{16} = 1 \)

15. Find the vertices and foci and graph the ellipse: \( 4x^2 + 9y^2 = 36 \)

16. Find an equation for the ellipse and graph:
   Foci at \((0, \pm2)\); length of the major axis is 8

17. Find the center, foci and vertices, and graph the ellipse:
   \( x^2 + 3y^2 - 12y + 9 = 0 \)

18. Find an equation for and graph the ellipse:
   Vertices at \((2, 5)\) and \((2, -1)\); \(c = 2\)

19. Jim, standing at one focus of a whispering gallery, is 6 feet from the nearest wall. His friend is standing at the other focus, 100 feet away. What is the length of this whispering gallery? How high is its elliptical ceiling at the center?

20. Find an equation for the hyperbola and graph:
   Center at \((0, 0)\); focus at \((0, 5)\); vertex at \((0, 3)\)

21. Find an equation for the hyperbola and graph:
   Vertices at \((-4, 0)\) and \((4, 0)\); asymptote: the line \(y = 2x\)

22. Find the center, transverse axis, vertices, foci, asymptotes, and graph the equation: \( x^2 - y^2 = 4 \)