Concepts Review

1. If whenever \((x, y)\) is on a graph, \((-x, y)\) is also on the graph, then the graph is symmetric with respect to the \(\text{__}\).

2. If \((-4, 2)\) is on a graph that is symmetric with respect to the origin, then \(\text{__}\) is also on the graph.

Problem Set 0.4

In Problems 1–30, plot the graph of each equation. Begin by checking for symmetries and be sure to find all \(x\)- and \(y\)-intercepts.

1. \(y = -x^2 + 1\)  
2. \(x = -y^2 + 1\)  
3. \(x = -4y^2 - 1\)  
4. \(y = 4x^2 - 1\)  
5. \(x^2 + y = 0\)  
6. \(y = x^2 - 2x\)  
7. \(7x^2 + 3y = 0\)  
8. \(y = 3x^2 - 2x + 2\)  
9. \(x^2 + y^2 = 4\)  
10. \(3x^2 + 4y^2 = 12\)  
11. \(y = -x^2 - 2x + 2\)  
12. \(4x^2 + 3y^2 = 12\)  
13. \(x^2 - y^2 = 4\)  
14. \(x^2 + (y - 1)^2 = 9\)  
15. \(4(x - 1)^2 + y^2 = 36\)  
16. \(x^2 - 4x + 3y^2 = -2\)  
17. \(x^2 + 9(y + 2)^2 = 36\)

\(\mathbf{GC}\) 18. \(x^4 + y^4 = 1\)  
\(\mathbf{GC}\) 19. \(x^4 + y^4 = 16\)  
\(\mathbf{GC}\) 20. \(y = x^3 - x\)  
\(\mathbf{GC}\) 21. \(y = \frac{1}{x^2 - 1}\)  
\(\mathbf{GC}\) 22. \(y = \frac{x}{x^2 + 1}\)  
\(\mathbf{GC}\) 23. \(2x^2 - 4x + 3y^2 + 12y = -2\)  
\(\mathbf{GC}\) 24. \(4(x - 5)^2 + 9(y + 2)^2 = 36\)  
\(\mathbf{GC}\) 25. \(y = (x - 1)(x - 2)(x - 3)\)  
\(\mathbf{GC}\) 26. \(y = x^2(x - 1)(x - 2)\)  
\(\mathbf{GC}\) 27. \(y = x^2(x - 1)^2\)  
\(\mathbf{GC}\) 28. \(y = x^4(x - 1)^4(x + 1)^4\)  
\(\mathbf{GC}\) 29. \(|x| + |y| = 1\)  
\(\mathbf{GC}\) 30. \(|x| + |y| = 4\)  

\(\mathbf{GC}\) In Problems 31–38, plot the graphs of both equations on the same coordinate plane. Find and label the points of intersection of the two graphs (see Example 4).

31. \(y = -x + 1\)  
\(y = (x + 1)^2\)  
32. \(y = 2x + 3\)  
\(y = -(x - 1)^2\)  
33. \(y = -2x + 3\)  
\(y = 2(x - 4)^2\)  
34. \(y = -2x + 3\)  
\(y = 3x^2 - 3x + 12\)  
35. \(y = x\)  
\(x^2 + y^2 = 4\)  
36. \(y = x - 1\)  
\(2x^2 + 3y^2 = 12\)

37. \(y - 3x = 1\)  
38. \(y = 4x + 3\)  
\(x^2 + 2x + y^2 = 15\)  
\(x^2 + y^2 = 81\)

39. Choose the equation that corresponds to each graph Figure 8.
   (a) \(y = ax^2\), with \(a > 0\)  
   (b) \(y = ax^2 + bx + c\), with \(a > 0\)  
   (c) \(y = ax^3 + bx^2 + cx + d\), with \(a < 0\)  
   (d) \(y = ax^3\), with \(a > 0\)

Figure 8

40. Find the distance between the points on the circle \(x^2 + y^2 = 13\) with the \(x\)-coordinates \(-2\) and \(2\). How many such distances are there?

41. Find the distance between the points on the circle \(x^2 + 2x + y^2 - 2y = 20\) with the \(x\)-coordinates \(-2\) and \(2\). How many such distances are there?

Answers to Concepts Review: 1. \(y\)-axis 2. \((4, -2)\)  
3. \(8, -2, 1, 4\) 4. line; parabola