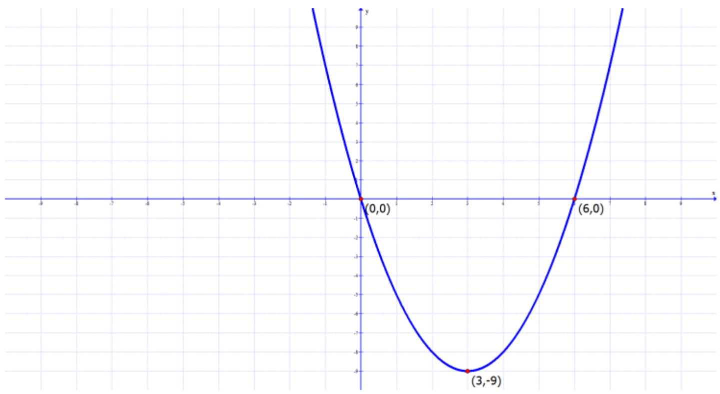
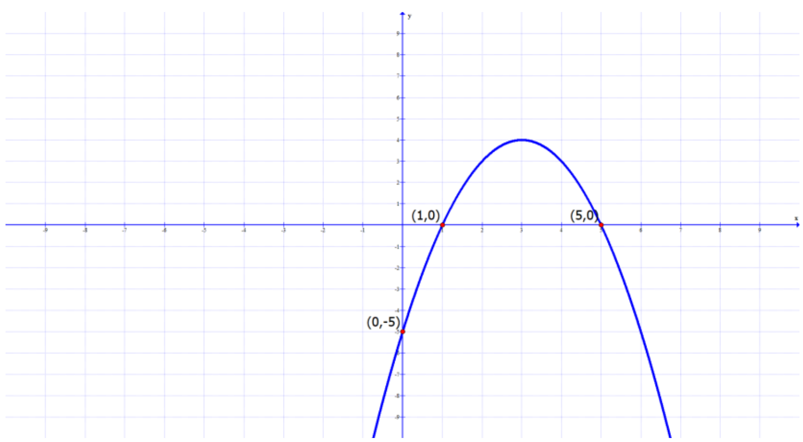
Section 2.1 Intercepts and symmetry

#1 – 4: Find the x and y-intercepts

1)



2)



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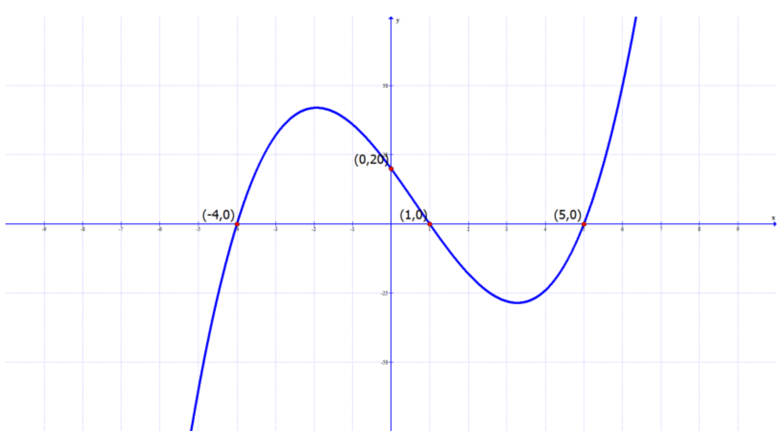

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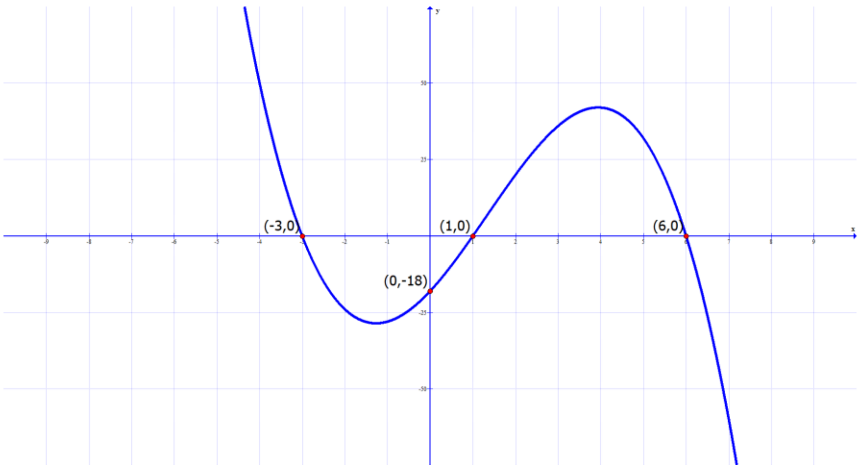


- To find an **x-intercept**, let the value of **y** in the equation be equal to zero. Your **x-intercept** will be written as a point (x,0).
- To find a **y-intercept**, let the value of **x** in the equation be equal to zero. Your **y-intercept** will be written as a point (0,y)

#5-12: Use Algebra to find the x and y-intercepts.

5) $3x - 6y = 24$

6) $2x + 4y = 12$

7) $y^2 = x + 9$

8) $y^2 = x + 16$

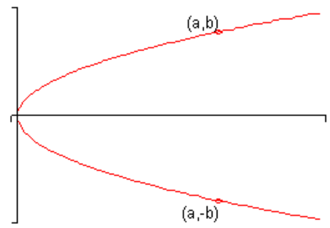
9) $y = x^2 + 4x - 5$

10) $y = x^2 + 3x - 4$

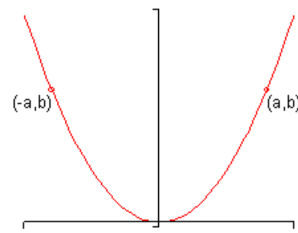
11) $x = y^2 - 6y + 8$

12) $x = y^2 - 7y + 10$

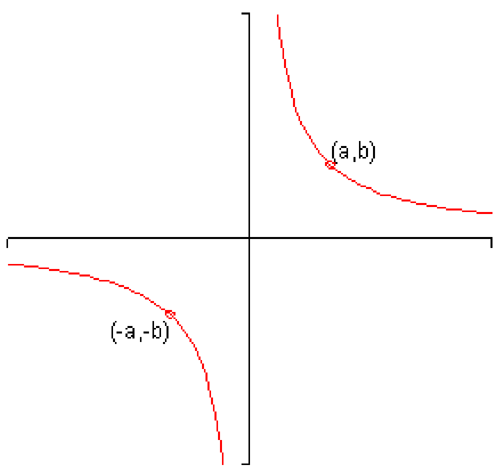
A graph is said to be **symmetric about the** x**-axis** if whenever (a,b) is on the graph then so is (a,−b) Here is a sketch of a graph that is symmetric about the x-axis. (A line drawn through the x-axis will split the graph into equal halves)



A graph is said to be **symmetric about the** y**-axis** if whenever (a,b) is on the graph then so is (−a,b). Here is a sketch of a graph that is symmetric about the y-axis. (A line drawn through the y-axis will split the graph into equal halves.)



A graph is said to be **symmetric about the origin** if whenever (a,b) is on the graph then so is (−a,−b). Here is a sketch of a graph that is symmetric about the origin.



#13 – 20: Plot each point. Then plot the point that is symmetric to it with respect to (a) the x-axis; (b) the y-axis; (c) the origin

13) (1,2)   14) (2,4)

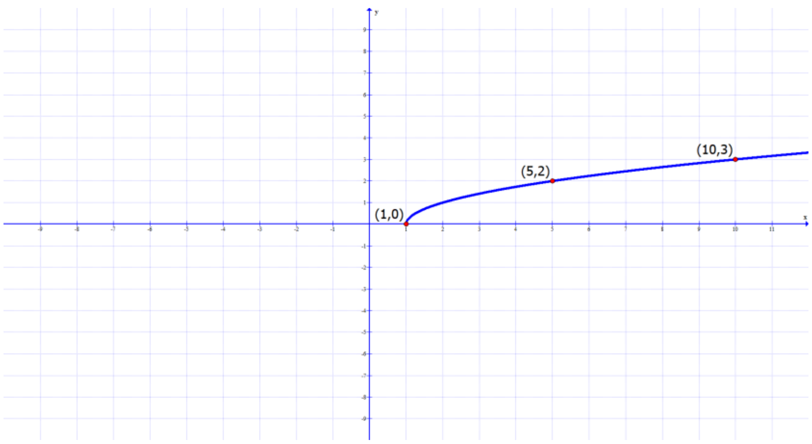
15) (-1, 3)   16) (-2, 5)

17) (5, 0)   18) (4, 0)

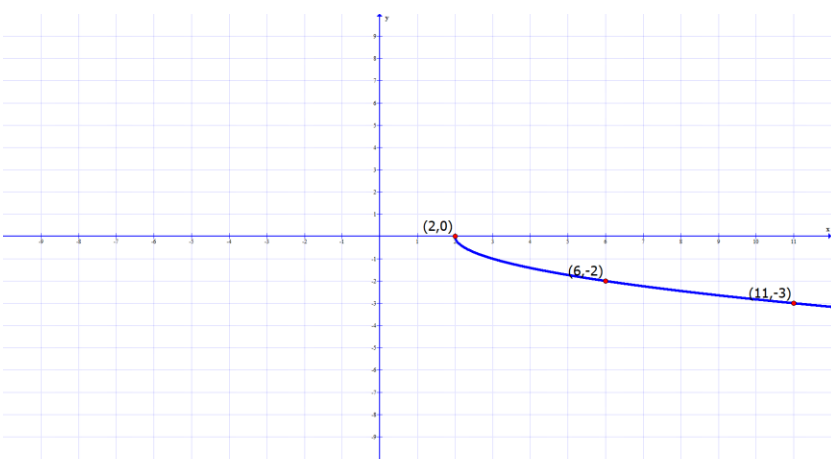
19) (0, -2)   20) (0, -3)

#21 – 26: draw a complete graph so that it has the indicated symmetry.

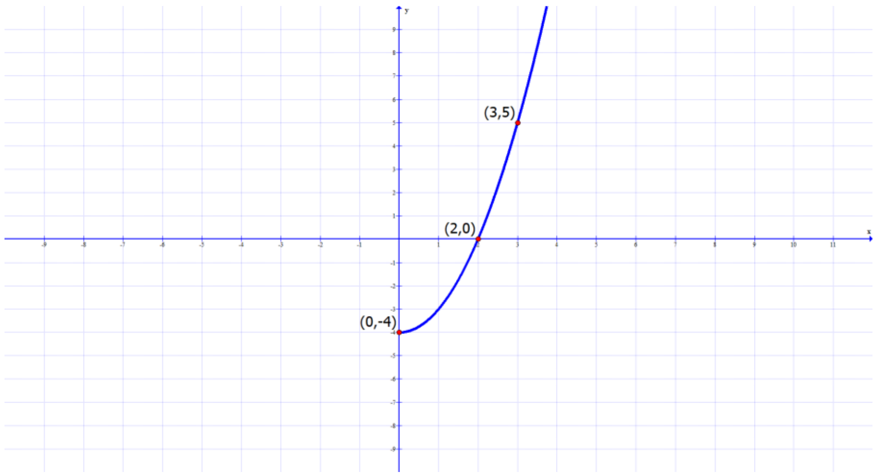
21) x-axis



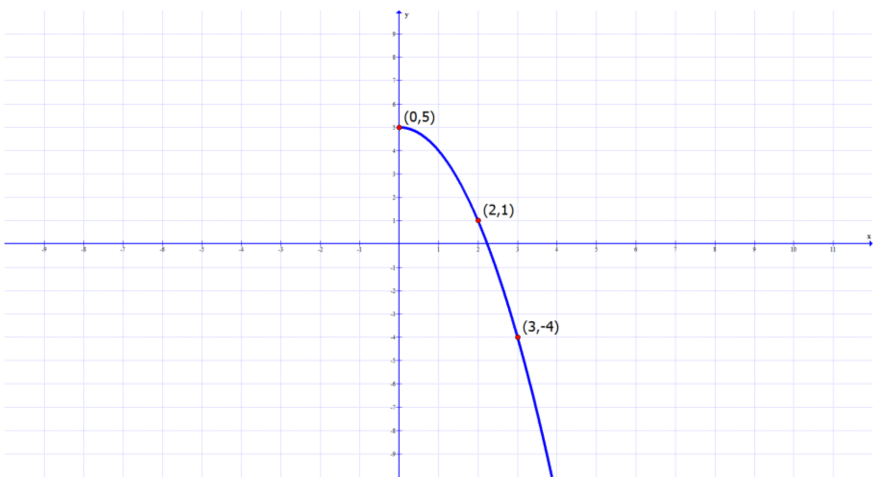
22) x-axis



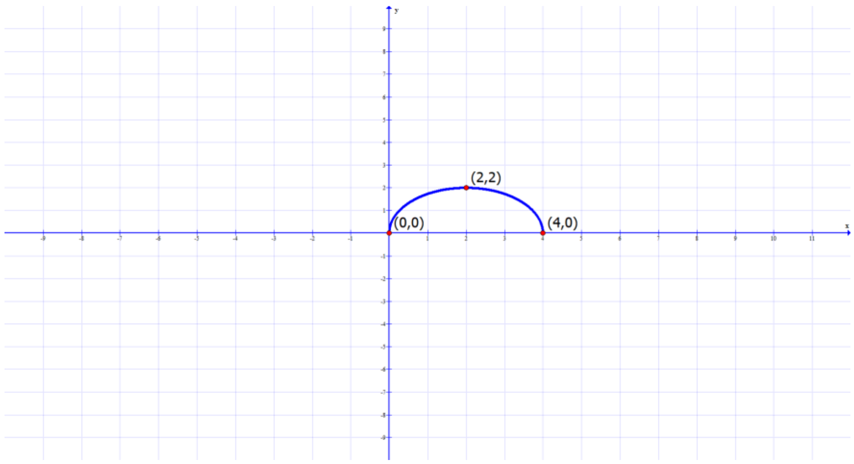
23) y-axis



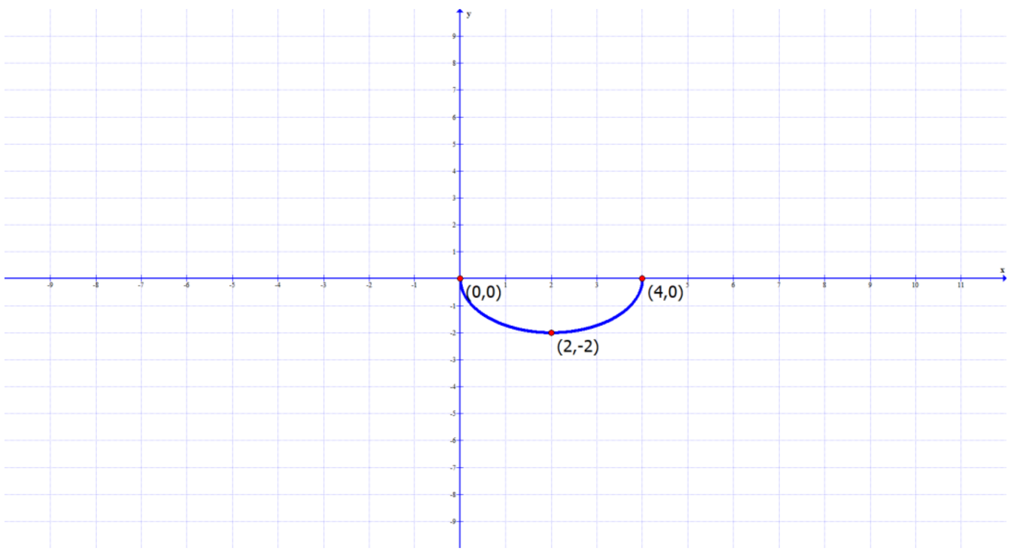
24) y-axis



25) Origin

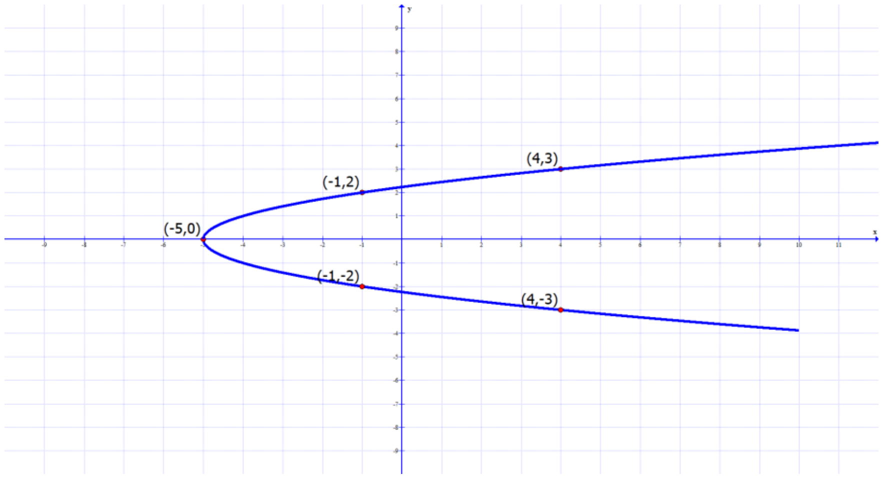


26) Origin



#27 – 32: determine the type of symmetry the graph of the equation has (if any).

27)



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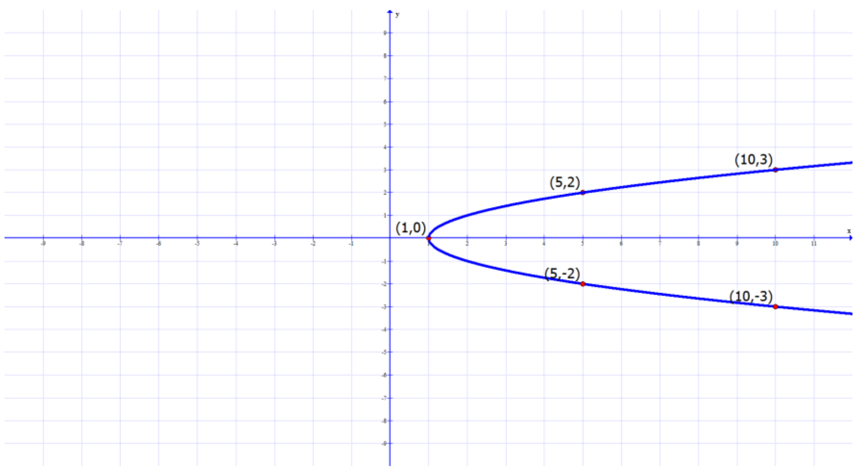

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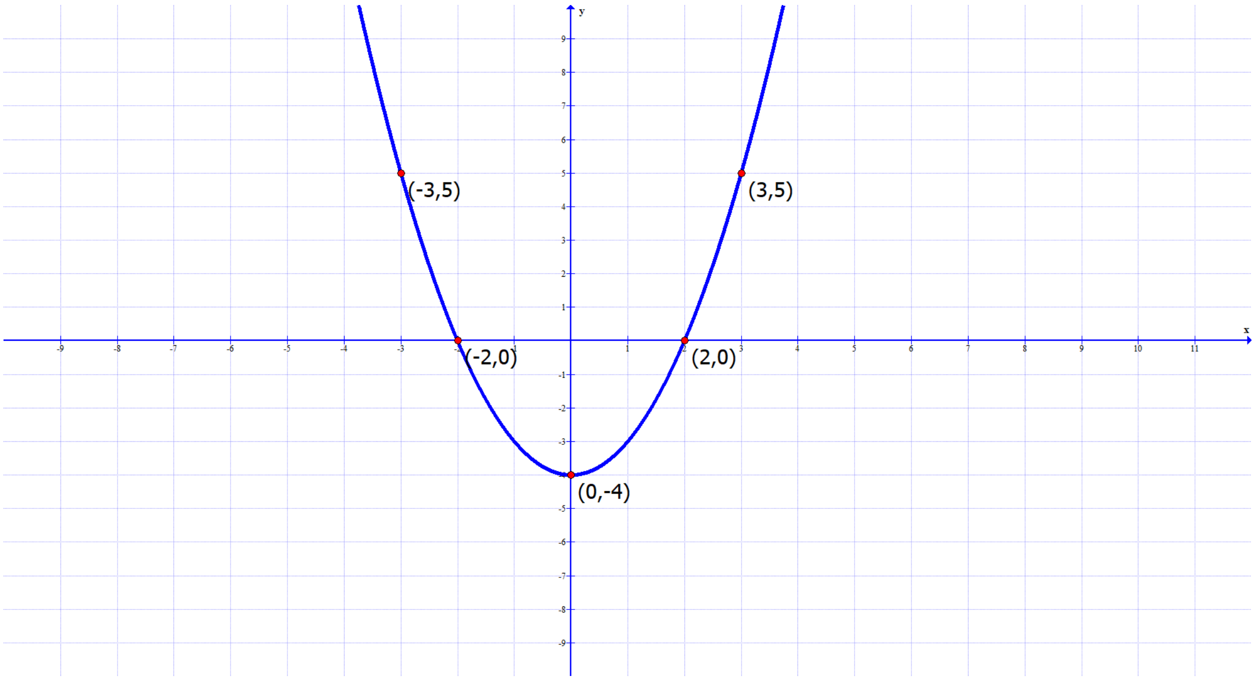

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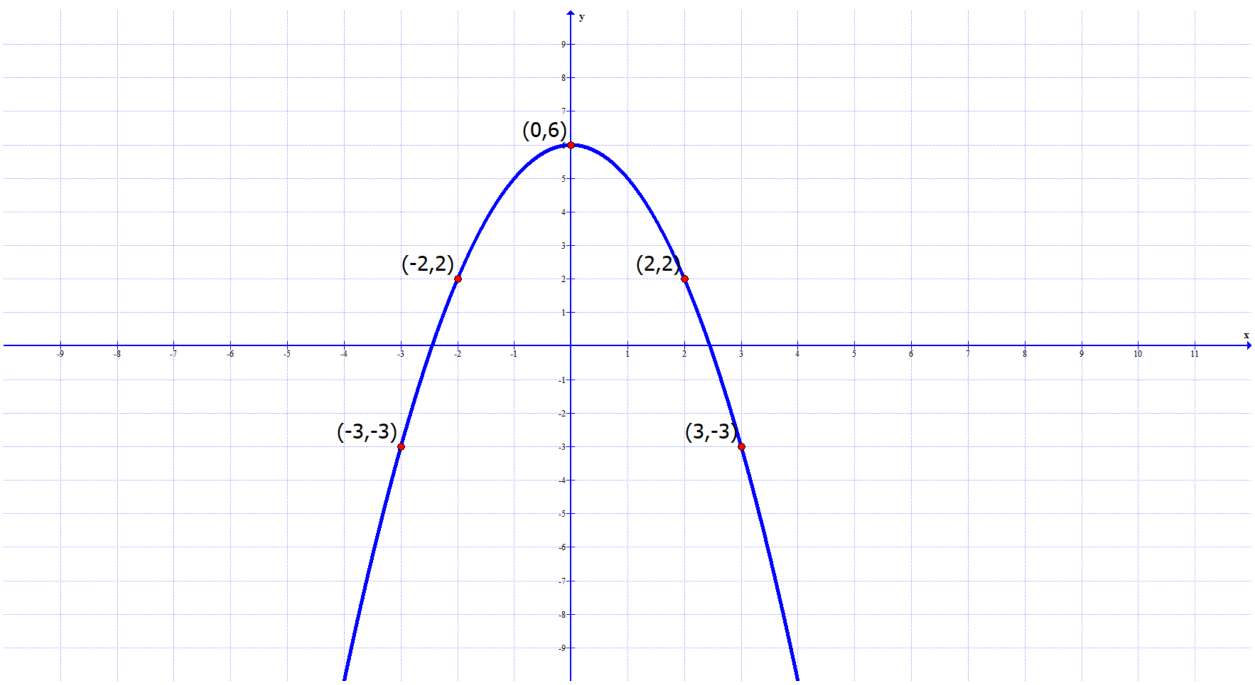
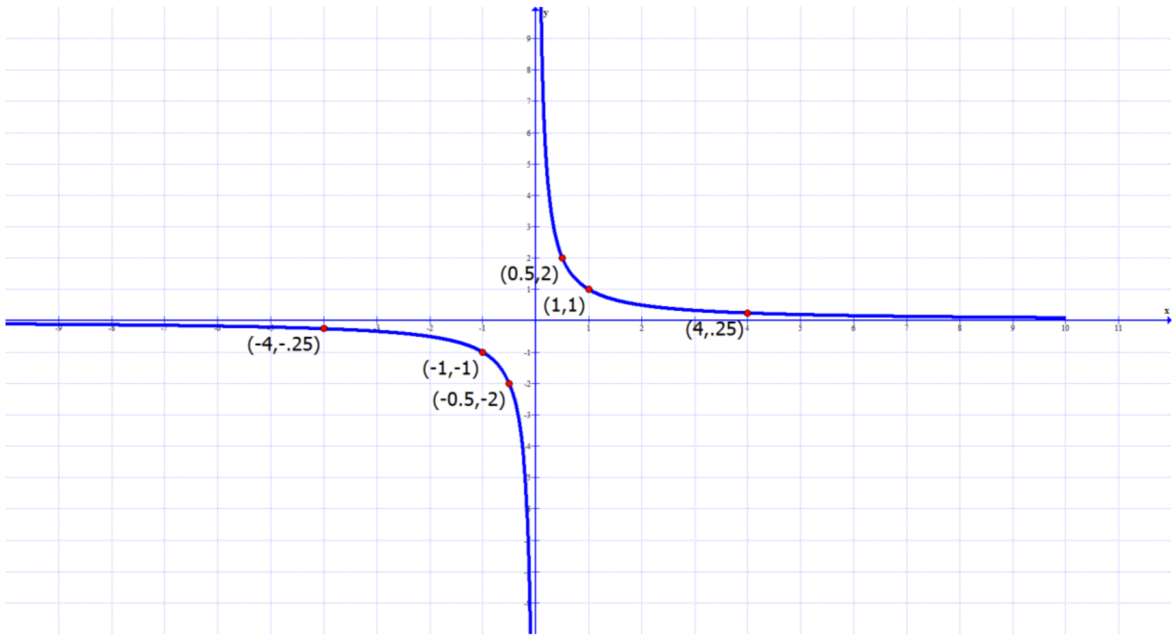
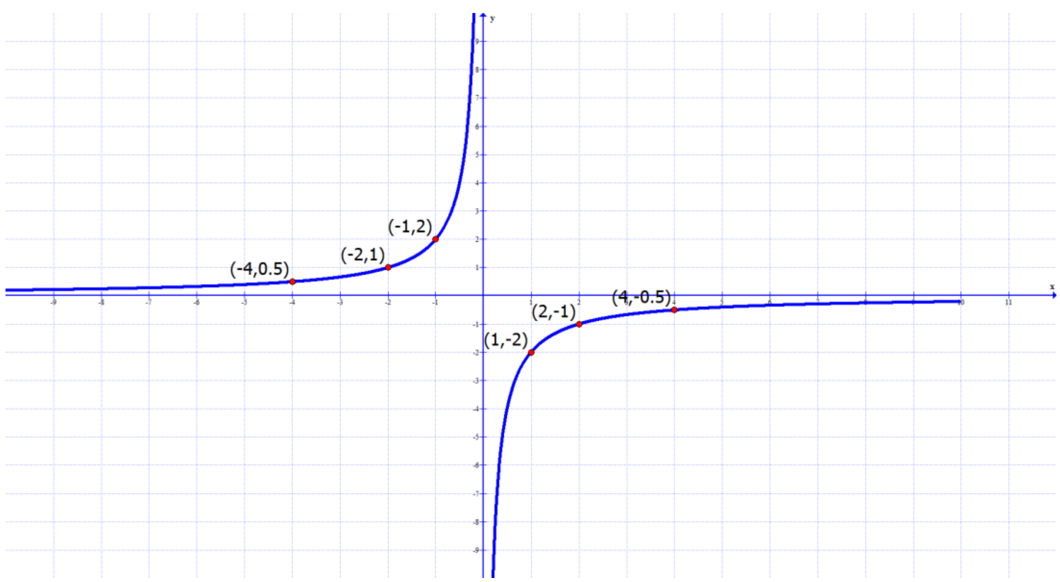


31)



32)



Symmetry tests:

1. A graph will have symmetry about the x-axis if we get an equivalent equation when all the y's are replaced with –y.

2. A graph will have symmetry about the y-axis if we get an equivalent equation when all the x's are replaced with –x.

3. A graph will have symmetry about the origin if we get an equivalent equation when all the y's are replaced with –y and all the x's are replaced with –x.

These two facts will be helpful as we try to solve #33 – 40

1. $(-x)^2 = x^2$

$$because\ \ (-x)^2 = (-x)(-x) = (-1x)(-1x) = (-1 * -1 * x * x) = x^2$$

2. $(-y)^2 = y^2$

$$because\ \ (-y)^2 = (-y)(-y) = (-1y)(-1y) = (-1 * -1 * y * y) = y^2$$

#33-40:

a) Solve the equation for y and sketch a graph of the function to determine the symmetry (if any) in the graph of the relation.

b) Use the appropriate test to determine the symmetry in of the graph of the relation. If the graph does not have one of the three symmetries answer – "none".

33) $x + y^2 = 16$

34) $x + y^2 = 4$

35) $y + x^2 = 4$

36) $y + x^2 = 9$

37) $y = \frac{3}{x}$

38) $y = \frac{5}{x}$

39) $y = x^2 + 4x - 1$

40) $y = x^2 + 6x + 3$

#41 – 43: Fill in the table and sketch a graph of these common functions.

41) $y = x^2$

x	y
-2	
-1	
0	
1	
2	

42) $y = x^3$

x	y
-2	
-1	
0	
1	
2	

43) $y = \sqrt{x}$

x	y
-2	
-1	
0	
1	
4	
9	
16	