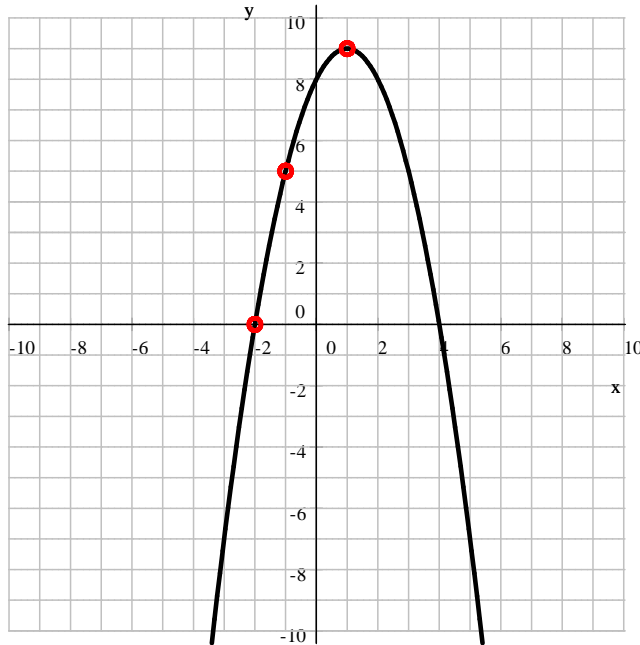


**Definition:** The graph of an equation in  $x$  and  $y$  is the set of all points  $P(x, y)$  whose coordinates are solution of the equation.

1. Consider the graph shown below.  $y = -x^2 + 2x + 8$



Among the many points on the graph,  $A(-2, 0)$ ,  $B(-1, 5)$ , and  $C(1, 9)$  are marked. We will use these points to find the equation that belongs with the graph. The equation for this graph is one of the equations listed below.

- (a) Consider the equation  $y = 3x + 6$ .

- i. Is the point  $A(-2, 0)$  on the graph of  $y = 3x + 6$ ?  $0 = 0$  **yes**
- ii. Is the point  $B(-1, 5)$  on the graph of  $y = 3x + 6$ ?  $5 \neq 3$  **no**
- iii. Is the point  $C(1, 9)$  on the graph of  $y = 3x + 6$ ?  $9 = 9$  **yes**
- iv. Is it possible that the graph shown on the picture above is the graph of  $y = 3x + 6$ ? **no**

- (b) Consider the equation  $(x - 4)^2 + (y - 5)^2 = 25$

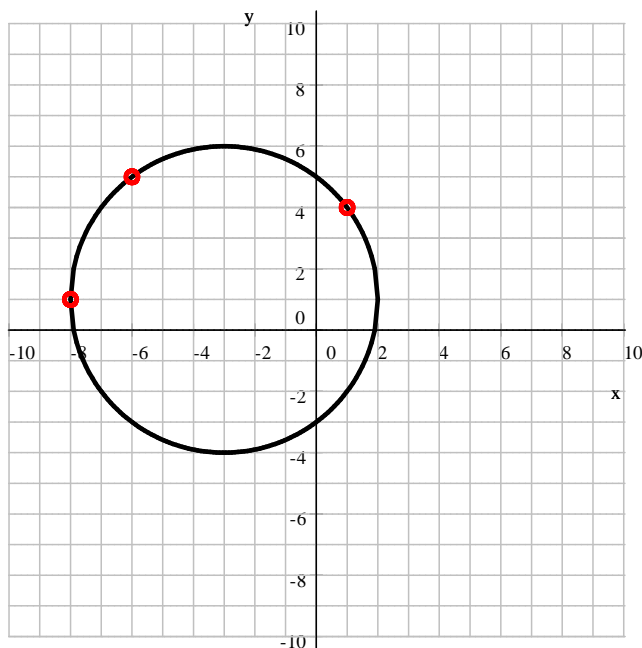
- i. Is the point  $A(-2, 0)$  on the graph of  $(x - 4)^2 + (y - 5)^2 = 25$ ?  $36 \neq 25$  **no**
- ii. Is the point  $B(-1, 5)$  on the graph of  $(x - 4)^2 + (y - 5)^2 = 25$ ?  $25 = 25$  **yes**
- iii. Is the point  $C(1, 9)$  on the graph of  $(x - 4)^2 + (y - 5)^2 = 25$ ?  $25 = 25$  **yes**
- iv. Is it possible that the graph shown on the picture above is the graph of  $(x - 4)^2 + (y - 5)^2 = 25$ ? **no**

- (c) Consider the equation  $y = -x^2 + 2x + 8$ .

- i. Is the point  $A(-2, 0)$  on the graph of  $y = -x^2 + 2x + 8$ ?  $0 = 0$  **yes**
- ii. Is the point  $B(-1, 5)$  on the graph of  $y = -x^2 + 2x + 8$ ?  $5 = 5$  **yes**
- iii. Is the point  $C(1, 9)$  on the graph of  $y = -x^2 + 2x + 8$ ?  $9 = 9$  **yes**
- iv. Is it possible that the graph shown on the picture above is the graph of  $y = -x^2 + 2x + 8$ ? **yes**

## Graphs of Equations

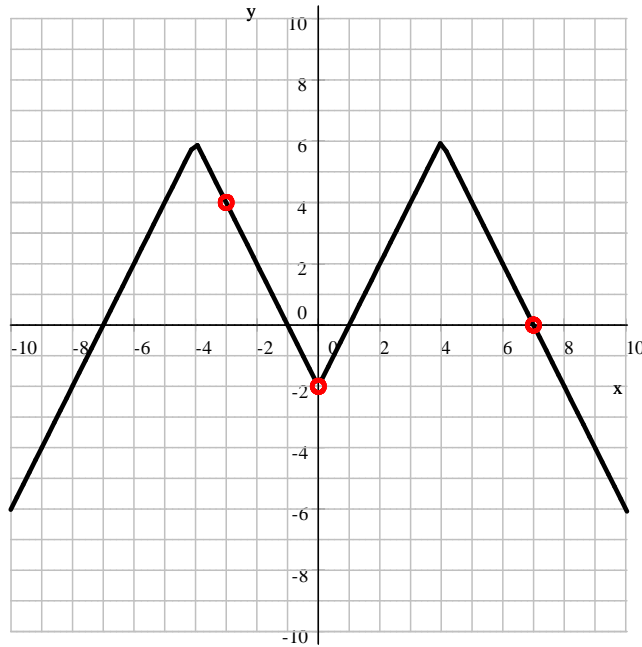
2. Consider the graph shown on the picture below.  $(x + 3)^2 + (y - 1)^2 = 25$   
 Note that the points  $A(-8, 1)$ ,  $B(-6, 5)$ , and  $C(1, 4)$  are on the graph.



- (a) Consider the equation  $3y = x + 11$ .
- Is the point  $A(-8, 1)$  on the graph of  $3y = x + 11$ ?  $3 = 3$  **yes**
  - Is the point  $B(-6, 5)$  on the graph of  $3y = x + 11$ ?  $15 \neq 5$  **no**
  - Is the point  $C(1, 4)$  on the graph of  $3y = x + 11$ ?  $12 = 12$  **yes**
  - Is it possible that the graph shown on the picture above is the graph of  $3y = x + 11$ ? **no**
- (b) Consider the equation  $3y + x^2 = -8x + 3$ .
- Is the point  $A(-8, 1)$  on the graph of  $3y + x^2 = -8x + 3$ ?  $67 = 67$  **yes**
  - Is the point  $B(-6, 5)$  on the graph of  $3y + x^2 = -8x + 3$ ?  $51 = 51$  **yes**
  - Is the point  $C(1, 4)$  on the graph of  $3y + x^2 = -8x + 3$ ?  $13 \neq -5$  **no**
  - Is it possible that the graph shown on the picture above is the graph of  $3y + x^2 = -8x + 3$ ? **no**
- (c) Consider the equation  $(x + 3)^2 + (y - 1)^2 = 25$ .
- Is the point  $A(-8, 1)$  on the graph of  $(x + 3)^2 + (y - 1)^2 = 25$ ?  $25 = 25$  **yes**
  - Is the point  $B(-6, 5)$  on the graph of  $(x + 3)^2 + (y - 1)^2 = 25$ ?  $25 = 25$  **yes**
  - Is the point  $C(1, 4)$  on the graph of  $(x + 3)^2 + (y - 1)^2 = 25$ ?  $25 = 25$  **yes**
  - Is it possible that the graph shown on the picture above is the graph of  $(x + 3)^2 + (y - 1)^2 = 25$ ? **yes**

3. Consider the graph shown below.  $6 - y = |8 - |2x||$

Note that the points  $A(-3, 4)$ ,  $B(0, -2)$ , and  $C(7, 0)$  are on the graph.



(a) Consider the equation  $y + 2 = |2x|$ .

- i. Is the point  $A(-3, 4)$  on the graph of  $y + 2 = |2x|$ ?  $6 = 6$  **yes**
- ii. Is the point  $B(0, -2)$  on the graph of  $y + 2 = |2x|$ ?  $2 = 2$  **yes**
- iii. Is the point  $C(7, 0)$  on the graph of  $y + 2 = |2x|$ ?  $2 \neq 14$  **no**
- iv. Is it possible that the graph shown on the picture above is the graph of  $y + 2 = |2x|$ ? **no**

(b) Consider the equation  $6 - y = |8 - |2x||$ .

- i. Is the point  $A(-3, 4)$  on the graph of  $6 - y = |8 - |2x||$ ?  $2 = 2$  **yes**
- ii. Is the point  $B(0, -2)$  on the graph of  $6 - y = |8 - |2x||$ ?  $8 = 8$  **yes**
- iii. Is the point  $C(7, 0)$  on the graph of  $6 - y = |8 - |2x||$ ?  $6 = 6$  **yes**
- iv. Is it possible that the graph shown on the picture above is the graph of  $6 - y = |8 - |2x||$ ? **yes**

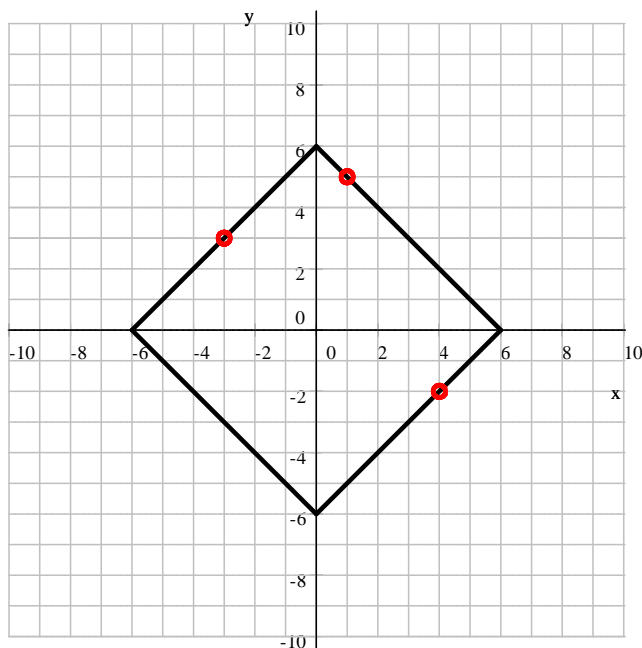
(c) Consider the equation  $x^2 + y^2 = 1 + 4(x + y + 5)$ .

- i. Is the point  $A(-3, 4)$  on the graph of  $x^2 + y^2 = 1 + 4(x + y + 5)$ ?  $25 = 25$  **yes**
- ii. Is the point  $B(0, -2)$  on the graph of  $x^2 + y^2 = 1 + 4(x + y + 5)$ ?  $4 \neq 13$  **no**
- iii. Is the point  $C(7, 0)$  on the graph of  $x^2 + y^2 = 1 + 4(x + y + 5)$ ?  $49 = 49$  **yes**
- iv. Is it possible that the graph shown on the picture above is the graph of  $x^2 + y^2 = 1 + 4(x + y + 5)$ ? **no**

## Graphs of Equations

4. Consider the graph shown on the picture below.  $|x| + |y| = 6$

Note that the points  $A(-3, 3)$ ,  $B(1, 5)$ , and  $C(4, -2)$  are on the graph.



(a) Consider the equation  $2y = x + 9$ .

- i. Is the point  $A(-3, 3)$  on the graph of  $2y = x + 9$ ?  $6 = 6$  **yes**
- ii. Is the point  $B(1, 5)$  on the graph of  $2y = x + 9$ ?  $10 = 10$  **yes**
- iii. Is the point  $C(4, -2)$  on the graph of  $2y = x + 9$ ?  $-4 \neq 13$  **no**
- iv. Is it possible that the graph shown on the picture above is the graph of  $2y = x + 9$ ? **no**

(b) Consider the equation  $|x| + |y| = 6$ .

- i. Is the point  $A(-3, 3)$  on the graph of  $|x| + |y| = 6$ ?  $6 = 6$  **yes**
- ii. Is the point  $B(1, 5)$  on the graph of  $|x| + |y| = 6$ ?  $6 = 6$  **yes**
- iii. Is the point  $C(4, -2)$  on the graph of  $|x| + |y| = 6$ ?  $6 = 6$  **yes**
- iv. Is it possible that the graph shown on the picture above is the graph of  $|x| + |y| = 6$ ? **yes**

(c) Consider the equation  $y + 3 = 9 - |x|$ .

- i. Is the point  $A(-3, 3)$  on the graph of  $y + 3 = 9 - |x|$ ?  $6 = 6$  **yes**
- ii. Is the point  $B(1, 5)$  on the graph of  $y + 3 = 9 - |x|$ ?  $8 = 8$  **yes**
- iii. Is the point  $C(4, -2)$  on the graph of  $y + 3 = 9 - |x|$ ?  $1 \neq 5$  **no**
- iv. Is it possible that the graph shown on the picture above is the graph of  $y + 3 = 9 - |x|$ ? **no**