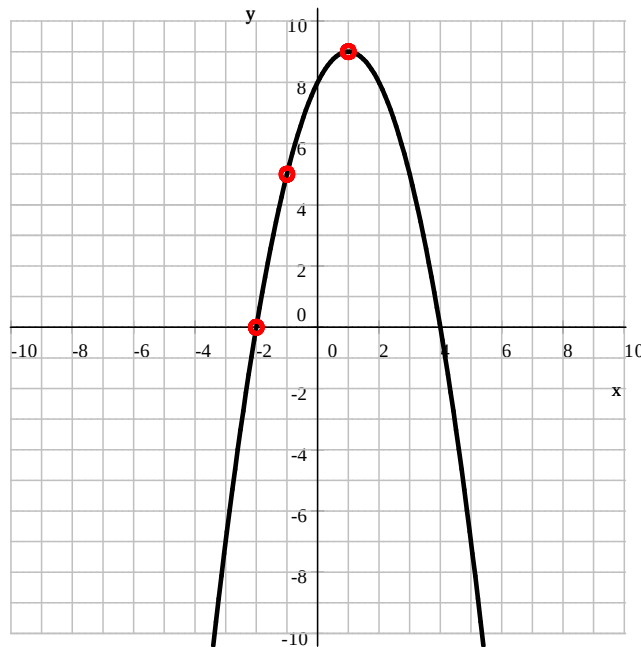


Definition: The graph of an equation in x and y is the set of all points $P(x, y)$ whose coordinates are solution of the equation.

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**

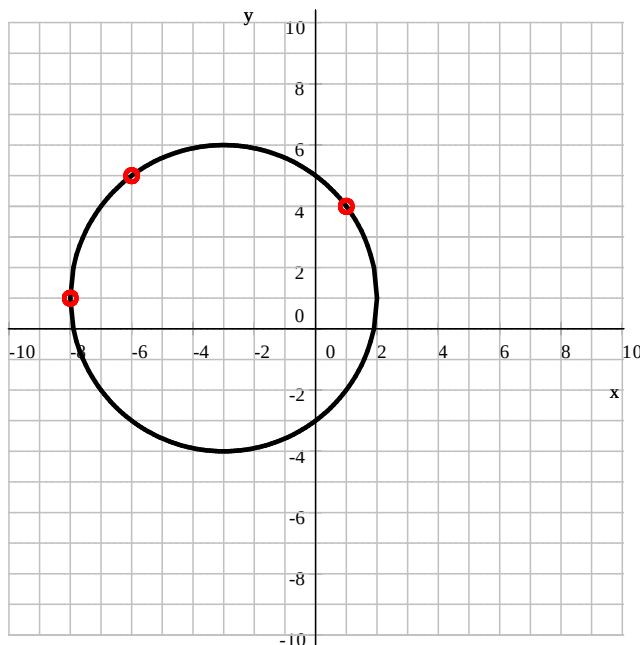
- (c) Consider the equation $y = -x^2 + 2x + 8$.

- 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 $3y + x^2 = -8x + 3$.

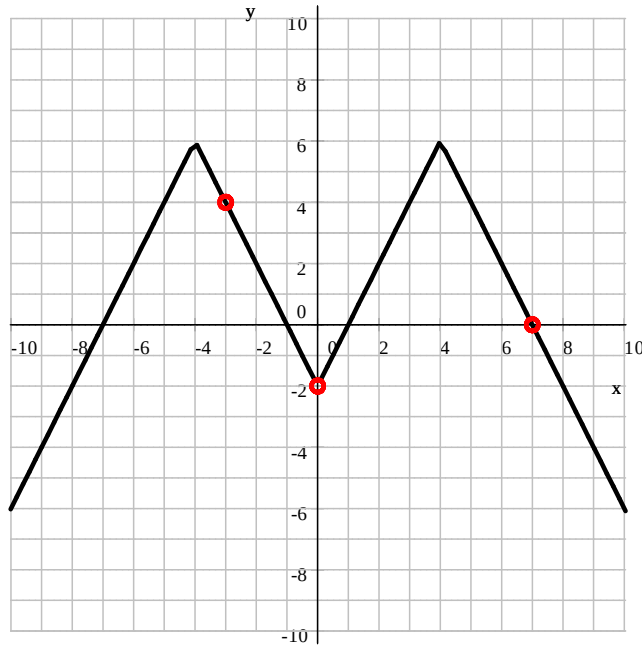
- Is the point $A(-8, 1)$ on the graph of $3y + x^2 = -8x + 3$? $67 = 67$ yes
- Is the point $B(-6, 5)$ on the graph of $3y + x^2 = -8x + 3$? $51 = 51$ yes
- Is the point $C(1, 4)$ on the graph of $3y + x^2 = -8x + 3$? $13 \neq -5$ no
- Is it possible that the graph shown on the picture above is the 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 $6 - y = |8 - |2x||$.

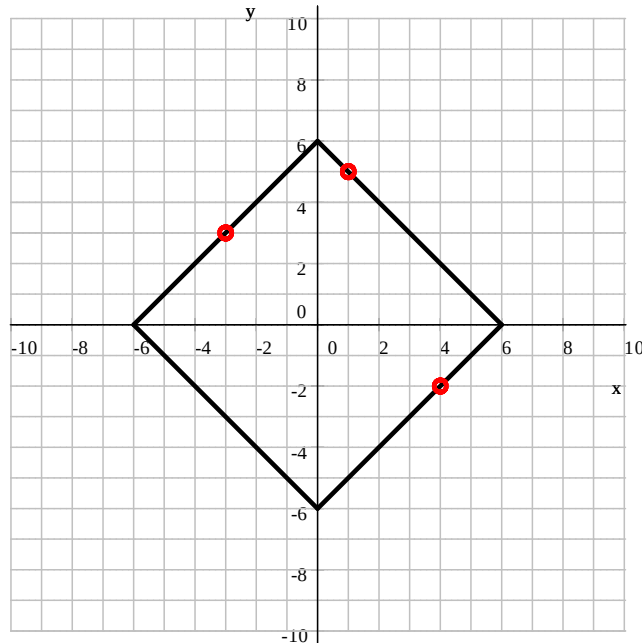
- i. Is the point $A(-3, 4)$ on the graph of $6 - y = |8 - |2x||$? $2 = 2$ yes
- ii. Is the point $B(0, -2)$ on the graph of $6 - y = |8 - |2x||$? $8 = 8$ yes
- iii. Is the point $C(7, 0)$ on the graph of $6 - y = |8 - |2x||$? $6 = 6$ yes
- iv. Is it possible that the graph shown on the picture above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

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