

Chapter 9.3 Check Your Understanding

Exercises 1–6 True or False. Give reasons.

1. The system of equations

$$\sqrt{2}x - \sqrt{5}y = 4$$

$$\sqrt{3}x + \sqrt{7}y = 3$$

is a nonlinear system.

Answer:

False; both equations are of the form $ax + by = c$ where a , b , and c are numbers.

2. The graphs of $y = x^2$ and $y = -x - 1$ intersect at two points.

Answer:

False; draw the graphs and see that they do not intersect.

3. The graphs of $y = |x|$ and $y = x$ have in common only one point, $(0, 0)$.

Answer:

False; the graphs have infinitely many points in common, for all nonnegative values of x .

4. The system of equations

$$x - y = 0$$

$$x^2 + y^2 = 8$$

has exactly two solutions.

Answer:

True; draw the graphs and see that they intersect at 2 points.

5. The system

$$x - 2y - 1 = 0$$

$$x^2 + y^2 + 1 = 0$$

has no real solutions.

Answer:

True; there are no real numbers x and y that satisfy $x^2 + y^2 + 1 = 0$.

6. The system

$$x^2 + y = 0$$

$$x^2 - y = 0$$

has no real solutions.

Answer:

False; $x = 0, y = 0$ is a solution.

Exercises 7–10 Fill in the blank so that the resulting statement is true.

7. The graphs of $y = x^2 - 1$ and $y = 1 - x^2$ intersect at _____.

Answer:

$y = x^2 - 1$ and $y = 1 - x^2$, then $x^2 - 1 = 1 - x^2$, $2x^2 = 2$, $x^2 = 1$, $x = \pm 1$. For $x = \pm 1$, $y = x^2 - 1 = 1 - 1 = 0$. The two graphs intersect at $(1, 0)$ and $(-1, 0)$.

8. The graphs of $x^2 + y^2 = 25$ and $4x + 3y = 0$ intersect at _____.

Answer:

From $4x + 3y = 0$, $y = -\frac{4}{3}x$; substitute into $x^2 + y^2 = 25$, $x^2 + (-\frac{4}{3}x)^2 = 25$, $\frac{25}{9}x^2 = 25$, $x^2 = 9$. Therefore $x = \pm 3$ and $y = -\frac{4}{3}x = \pm 4$. The graphs intersect at two points, $(3, -4)$ and $(-3, 4)$.

9. The graphs of $|x| + y = 0$ and $y + 2 = 0$ intersect at _____.

Answer:

From $y + 2 = 0$, $y = -2$; substitute into $|x| + y = 0$, $|x| - 2 = 0$, $|x| = 2$, and so $x = \pm 2$. The graphs intersect at two points, $(2, -2)$ and $(-2, -2)$.

10. The graphs of $y = |x| - 1$ and $y = 1 - |x|$ intersect at _____.

Answer:

$y = |x| - 1$ and $y = 1 - |x|$, then $|x| - 1 = 1 - |x|$, $2|x| = 2$, $|x| = 1$, and so $x = \pm 1$. For y substitute ± 1 in $y = |x| - 1$ and so $y = 0$. The two graphs intersect at two points, $(1, 0)$ and $(-1, 0)$.