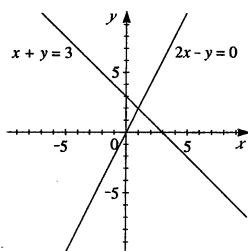


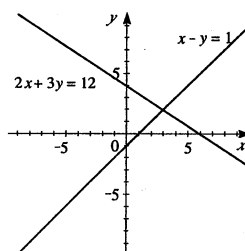
Exercises 10.2

$$1. \begin{cases} x + y = 3 \\ 2x - y = 0 \end{cases}$$



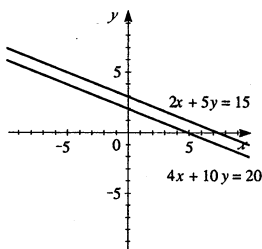
The solution is $x = 1, y = 2$.

$$3. \begin{cases} 2x + 3y = 12 \\ x - y = 1 \end{cases}$$



The solution is $x = 3, y = 2$.

$$5. \begin{cases} 2x + 5y = 15 \\ 4x + 10y = 20 \end{cases}$$



No solution. The lines are parallel, so there is no intersection.

$$7. \quad -x + y = 2 \Leftrightarrow y = x + 2. \text{ Substituting for } y \text{ into } 4x - 3y = -3 \text{ gives } 4x - 3(x + 2) = -3 \\ \Leftrightarrow 4x - 3x - 6 = -3 \Leftrightarrow x = 3, \text{ and so } y = (3) + 2 = 5. \text{ Hence, the solution is } (x, y) = (3, 5).$$

$$9. \quad x + 2y = 7 \Leftrightarrow x = 7 - 2y. \text{ Substituting for } x \text{ into } 5x - y = 2 \text{ gives } 5(7 - 2y) - y = 2 \Leftrightarrow \\ 35 - 10y - y = 2 \Leftrightarrow -11y = -33 \Leftrightarrow y = 3, \text{ and so } x = 7 - 2(3) = 1. \text{ Hence, the solution is } (1, 3).$$

$$11. \quad \frac{1}{2}x + \frac{1}{3}y = 2 \Leftrightarrow x + \frac{2}{3}y = 4 \Leftrightarrow x = 4 - \frac{2}{3}y. \text{ Substituting for } x \text{ into } \frac{1}{5}x - \frac{2}{3}y = 8 \text{ gives } \\ \frac{1}{5}(4 - \frac{2}{3}y) - \frac{2}{3}y = 8 \Leftrightarrow \frac{4}{5} - \frac{2}{15}y - \frac{10}{15}y = 8 \Leftrightarrow 12 - 2y - 10y = 120 \Leftrightarrow y = -9, \\ \text{and so } x = 4 - \frac{2}{3}(-9) = 10. \text{ Hence, the solution is } (10, -9).$$

$$13. \quad \begin{array}{r} \text{Adding gives } 3x + 2y = 8 \\ \quad \quad \quad x - 2y = 0 \\ \hline 4x = 8 \end{array} \Leftrightarrow x = 2.$$

So $x - 2y = (2) - 2y = 0 \Leftrightarrow 2y = 2 \Leftrightarrow y = 1$. Thus, the solution is $(2, 1)$.

$$15. \quad \begin{cases} x + 4y = 8 \\ 3x + 12y = 2 \end{cases} \text{ Adding } -3 \text{ times the first equation to the second equation gives} \\ \begin{array}{r} -3x - 12y = -24 \\ 3x + 12y = 2 \\ \hline 0 = -22, \text{ which is never true. Thus the system has no solution.} \end{array}$$