

Solution

Section 1.3 – Quadratic Functions

Exercise

Solve: $x^2 = -25$

Solution

$$x = \pm\sqrt{-25}$$
$$\underline{= \pm 5i}$$

Exercise

Solve: $x^2 = 49$

Solution

$$\underline{x = \pm 7}$$

Exercise

Solve: $9x^2 = 100$

Solution

$$x^2 = \frac{100}{9}$$
$$x = \pm\sqrt{\frac{100}{9}}$$
$$\underline{= \pm \frac{10}{3}}$$

Exercise

Solve: $4x^2 + 25 = 0$

Solution

$$4x^2 = -25$$
$$x^2 = -\frac{25}{4}$$
$$x = \pm\sqrt{-\frac{25}{4}}$$
$$\underline{= \pm \frac{5}{2}i}$$

Exercise

Solve: $5x^2 + 35 = 0$

Solution

$$5x^2 = -35$$

$$x^2 = -7$$

$$\underline{x = \pm i\sqrt{7} \mid}$$

Exercise

Solve: $5x^2 - 45 = 0$

Solution

$$5x^2 = 45$$

$$x = \frac{45}{5}$$

$$x^2 = 9$$

$$\underline{x = \pm 3 \mid}$$

Exercise

Solve: $(x - 4)^2 = 12$

Solution

$$x - 4 = \pm\sqrt{12}$$

$$x = 4 \pm \sqrt{12} \quad \sqrt{12} = \sqrt{4(3)} = 2\sqrt{3}$$

$$\underline{x = 4 \pm 2\sqrt{3} \mid}$$

Exercise

Solve: $(x + 3)^2 = -16$

Solution

$$x + 3 = \pm\sqrt{-16}$$

$$\underline{x = -3 \pm 4i \mid}$$

Exercise

Solve: $(x-2)^2 = -20$

Solution

$$x - 2 = \pm\sqrt{-20}$$

$$x = \underline{2 \pm 4i\sqrt{5}} \quad |$$

Exercise

Solve: $(4x+1)^2 = 20$

Solution

$$4x + 1 = \pm\sqrt{20}$$

$$4x = -1 \pm 2\sqrt{5}$$

$$x = \underline{\frac{-1 \pm 2\sqrt{5}}{4}} \quad |$$

Exercise

Solve $x^2 - 6x = -7$

Solution

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(7)}}{2(1)}$$

$$= \frac{6 \pm \sqrt{8}}{2}$$

$$= \frac{6 \pm 2\sqrt{2}}{2}$$

$$= \frac{2(3 \pm \sqrt{2})}{2}$$

$$= \underline{3 \pm \sqrt{2}} \quad |$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve $-6x^2 = 3x + 2$

Solution

$$6x^2 + 3x + 2 = 0$$

$$\begin{aligned}
 x &= \frac{-3 \pm \sqrt{3^2 - 4(6)(2)}}{2(6)} \\
 &= \frac{-3 \pm \sqrt{-39}}{12} \\
 &= \frac{-3}{12} \pm i \frac{\sqrt{39}}{12} \\
 &= \underline{-\frac{1}{4} \pm i \frac{\sqrt{39}}{12}}
 \end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $3x^2 + 2x = 7$

Solution

$$3x^2 + 2x - 7 = 0 \quad \Rightarrow \quad \mathbf{a = 3, \quad b = 2, \quad c = -7}$$

$$x = \frac{-2 \pm \sqrt{4 - 4(3)(-7)}}{2(3)}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-2 \pm \sqrt{88}}{6}$$

$$= \frac{-2 \pm \sqrt{4(22)}}{6}$$

$$= \frac{-2 \pm 2\sqrt{22}}{6}$$

$$= \frac{2(-1 \pm \sqrt{22})}{6}$$

$$= \underline{-\frac{1 \pm \sqrt{22}}{3}}$$

$$x = -\frac{1}{3} \pm \frac{\sqrt{22}}{3}$$

Exercise

$3x^2 + 6 = 10x$

Solution

$$3x^2 - 10x + 6 = 0$$

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(3)(6)}}{2(3)}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\begin{aligned}
&= \frac{10 \pm \sqrt{100 - 72}}{6} \\
&= \frac{10}{6} \pm \frac{\sqrt{28}}{6} \\
&= \frac{5}{3} \pm \frac{2\sqrt{7}}{6} \\
&= \frac{5}{3} \pm \frac{\sqrt{7}}{3}
\end{aligned}$$

Exercise

Solve: $5x^2 + 2 = x$

Solution

$$5x^2 - x + 2 = 0$$

$$\begin{aligned}
x &= \frac{1 \pm \sqrt{1 - 40}}{10} \\
&= \frac{1 \pm \sqrt{-39}}{10} \\
&= \frac{1 \pm i\sqrt{39}}{10} \\
&= \frac{1}{10} \pm i \frac{\sqrt{39}}{10}
\end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $5x^2 = 2x - 3$

Solution

$$5x^2 - 2x + 3 = 0$$

$$\begin{aligned}
x &= \frac{-(-2) \pm \sqrt{(-2)^2 - 4(5)(3)}}{2(5)} \\
&= \frac{2 \pm \sqrt{4 - 60}}{10} \\
&= \frac{2 \pm \sqrt{-56}}{10} \\
&= \frac{2 \pm i\sqrt{4(14)}}{10}
\end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\begin{aligned}
&= \frac{2 \pm i2\sqrt{14}}{10} \\
&= \frac{2}{10} \pm i \frac{2\sqrt{14}}{10} \\
&= \frac{1}{5} \pm i \frac{\sqrt{14}}{5}
\end{aligned}$$

Exercise

Solve: $x^2 + 8x + 15 = 0$

Solution

$$x = \frac{-8 \pm \sqrt{8^2 - 4(1)(15)}}{2(1)}$$

$$= \frac{-8 \pm \sqrt{64 - 60}}{2}$$

$$= \frac{-8 \pm \sqrt{4}}{2}$$

$$= \frac{-8 \pm 2}{2}$$

$$= \left\{ \begin{aligned} \frac{-8+2}{2} &= \frac{-6}{2} = -3 \\ \frac{-8-2}{2} &= \frac{-10}{2} = -5 \end{aligned} \right\}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^2 + 5x + 2 = 0$

Solution

$$x = \frac{-5 \pm \sqrt{5^2 - 4(1)(2)}}{2(1)}$$

$$= \frac{-5 \pm \sqrt{25 - 8}}{2}$$

$$= \frac{-5 \pm \sqrt{17}}{2}$$

$$= \frac{-5}{2} \pm \frac{\sqrt{17}}{2}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^2 + x - 12 = 0$

Solution

$$\begin{aligned}x &= \frac{-1 \pm \sqrt{1 + 48}}{2} \\&= \frac{-1 \pm 7}{2} \\&= \begin{cases} \frac{-1 - 7}{2} = -4 \\ \frac{-1 + 7}{2} = 3 \end{cases}\end{aligned}$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^2 - 2x - 15 = 0$

Solution

$$\begin{aligned}x &= \frac{2 \pm \sqrt{4 + 60}}{2} \\&= \frac{2 \pm 8}{2} \\&= \begin{cases} \frac{2 + 8}{2} = 5 \\ \frac{2 - 8}{2} = -3 \end{cases}\end{aligned}$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^2 - 4x - 45 = 0$

Solution

$$\begin{aligned}x &= \frac{4 \pm \sqrt{16 + 180}}{2} \\&= \frac{4 \pm \sqrt{196}}{2} \\&= \frac{4 \pm 14}{2} \\&= \begin{cases} \frac{4 + 14}{2} = 9 \\ \frac{4 - 14}{2} = -5 \end{cases}\end{aligned}$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^2 - 6x - 10 = 0$

Solution

$$x^2 - 6x = 10$$

$$x^2 - 6x + \left(\frac{-6}{2}\right)^2 = 10 + \left(\frac{-6}{2}\right)^2$$

$$x^2 - 2(3)x + (3)^2 = 10 + 9$$

$$(x - 3)^2 = 19$$

$$x - 3 = \pm\sqrt{19}$$

$$\underline{x = 3 \pm \sqrt{19}}$$

Exercise

Solve: $2x^2 + 3x - 4 = 0$

Solution

$$x^2 + \frac{3}{2}x = 2$$

$$x^2 + \frac{3}{2}x + \left(\frac{1 \cdot 3}{2 \cdot 2}\right)^2 = 2 + \left(\frac{1 \cdot 3}{2 \cdot 2}\right)^2$$

$$x^2 + \frac{3}{2}x + \left(\frac{3}{4}\right)^2 = 2 + \frac{9}{16}$$

$$\left(x + \frac{3}{4}\right)^2 = \frac{41}{16}$$

$$x + \frac{3}{4} = \pm\sqrt{\frac{41}{16}}$$

$$\underline{x = -\frac{3}{4} \pm \frac{\sqrt{41}}{4}}$$

Exercise

Solve $x^2 - x + 8 = 0$

Solution

$$x = \frac{1 \pm \sqrt{1 - 32}}{2}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{1 \pm \sqrt{-31}}{2}$$

$$= \frac{1 \pm i\sqrt{31}}{2}$$

Exercise

Solve $2x^2 - 13x = 1$

Solution

$$2x^2 - 13x - 1 = 0$$

$$x = \frac{13 \pm \sqrt{169 + 8}}{4}$$

$$= \frac{13 \pm \sqrt{169 + 8}}{4}$$

$$= \frac{13 \pm \sqrt{177}}{4}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve $r^2 + 3r - 3 = 0$

Solution

$$r = \frac{-3 \pm \sqrt{3^2 - 4(1)(-3)}}{2(1)}$$

$$= \frac{-3 \pm \sqrt{9 + 12}}{2}$$

$$= \frac{-3 \pm \sqrt{21}}{2}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^3 + 8 = 0$

Solution

$$(x + 2)(x^2 - 2x + 4) = 0$$

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$x + 2 = 0$$

$$x^2 - 2x + 4 = 0$$

$$x = -2$$

$$\begin{aligned} x &= \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(4)}}{2(1)} \\ &= \frac{2 \pm \sqrt{-12}}{2} \\ &= \frac{2 \pm 2i\sqrt{3}}{2} \\ &= \frac{2(1 \pm i\sqrt{3})}{2} \\ &= 1 \pm i\sqrt{3} \end{aligned}$$

The solution set is $\{-2, 1 \pm i\sqrt{3}\}$

Exercise

Solve: $4x^2 - 12x + 9 = 0$

Solution

$$\begin{aligned} x &= \frac{12 \pm \sqrt{144 - 144}}{8} \\ &= \frac{12}{8} \\ &= \frac{3}{2} \end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $9x^2 - 30x + 25 = 0$

Solution

$$\begin{aligned} x &= \frac{30 \pm \sqrt{900 - 900}}{18} \\ &= \frac{30}{18} \\ &= \frac{5}{3} \end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^2 - 14x + 49 = 0$

Solution

$$\begin{aligned}
 x &= \frac{14 \pm \sqrt{196 - 196}}{2} \\
 &= \frac{14}{2} \\
 &= 7
 \end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^2 - 8x + 16 = 0$

Solution

$$\begin{aligned}
 x &= \frac{8 \pm \sqrt{64 - 64}}{2} \\
 &= \frac{8}{2} \\
 &= 4
 \end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^2 + 6x + 13 = 0$

Solution

$$\begin{aligned}
 x &= \frac{-6 \pm \sqrt{36 - 52}}{2} \\
 &= \frac{-6 \pm \sqrt{-16}}{2} \\
 &= \frac{-6 \pm 4i}{2} \\
 &= -3 \pm 2i
 \end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $2x^2 - 2x + 13 = 0$

Solution

$$\begin{aligned}
 x &= \frac{2 \pm \sqrt{4 - 104}}{4} \\
 &= \frac{2 \pm \sqrt{-100}}{4}
 \end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{2 \pm 10i}{4}$$

$$= \frac{1}{2} \pm \frac{5}{2}i$$

Exercise

Solve: $x^2 + 2x + 29 = 0$

Solution

$$x = \frac{-2 \pm \sqrt{4 - 116}}{2}$$

$$= \frac{-2 \pm \sqrt{-112}}{2}$$

$$= \frac{-2 \pm 4i\sqrt{7}}{2}$$

$$= -1 \pm 2i\sqrt{7}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $4x^2 + 4x + 13 = 0$

Solution

$$x = \frac{-4 \pm \sqrt{16 - 16(13)}}{8}$$

$$= \frac{-4 \pm 4\sqrt{-12}}{8}$$

$$= \frac{-4 \pm 8i\sqrt{3}}{8}$$

$$= -\frac{1}{2} \pm i\sqrt{3}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^2 - 2x + 26 = 0$

Solution

$$x = \frac{2 \pm \sqrt{4 - 4(26)}}{2}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{2 \pm 2\sqrt{-25}}{2}$$

$$= \underline{1 \pm 5i}$$

Exercise

Solve: $9x^2 - 4x + 20 = 0$

Solution

$$x = \frac{4 \pm \sqrt{16 - 16(45)}}{18}$$

$$= \frac{4 \pm 4\sqrt{-44}}{18}$$

$$= \frac{-4 \pm 8i\sqrt{11}}{8}$$

$$= \underline{-\frac{1}{2} \pm i\sqrt{11}}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^2 + 6x + 21 = 0$

Solution

$$x = \frac{-6 \pm \sqrt{36 - 84}}{2}$$

$$= \frac{-6 \pm \sqrt{-48}}{2}$$

$$= \frac{-6 \pm 4i\sqrt{3}}{2}$$

$$= \underline{-3 \pm 2i\sqrt{3}}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $9x^2 - 12x - 49 = 0$

Solution

$$x = \frac{12 \pm \sqrt{2^4 3^2 - 2^2 3^2 7^2}}{18}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\begin{aligned}
&= \frac{12 \pm 6\sqrt{4-49}}{18} \\
&= \frac{12 \pm 6\sqrt{-45}}{18} \\
&= \frac{12 \pm 18i\sqrt{5}}{18} \\
&= \underline{\underline{\frac{2}{3} \pm i\sqrt{5}}}
\end{aligned}$$

Exercise

Solve: $x(x-3) = 18$

Solution

$$x^2 - 3x - 18 = 0$$

$$x = \frac{3 \pm \sqrt{9+72}}{2}$$

$$= \frac{3 \pm 9}{2}$$

$$= \left\{ \begin{array}{l} \frac{3+9}{2} = 6 \\ \frac{3-9}{2} = -3 \end{array} \right.$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x(x-4) - 21 = 0$

Solution

$$x^2 - 4x - 21 = 0$$

$$x = \frac{4 \pm \sqrt{16+84}}{2}$$

$$= \frac{4 \pm 10}{2}$$

$$= \left\{ \begin{array}{l} \frac{4+10}{2} = 7 \\ \frac{4-10}{2} = -3 \end{array} \right.$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $(x-1)(x+4) = 14$

Solution

$$x^2 + 3x - 18 = 0$$

$$x = \frac{-3 \pm \sqrt{9 + 72}}{2}$$

$$= \frac{-3 \pm 9}{2}$$

$$= \left\{ \begin{array}{l} \frac{-3+9}{2} = 3 \\ \frac{-3-9}{2} = -6 \end{array} \right|$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $(x-3)(x+8) = -30$

Solution

$$x^2 + 5x + 6 = 0$$

$$x = \frac{-5 \pm \sqrt{25 - 24}}{2}$$

$$= \frac{-5 \pm 1}{2}$$

$$= \left\{ \begin{array}{l} \frac{-5+1}{2} = -2 \\ \frac{-5-1}{2} = -3 \end{array} \right|$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x(x+8) = 16(x-1)$

Solution

$$x^2 + 8x = 16x - 16$$

$$x^2 - 8x + 16 = 0$$

$$x = \frac{8 \pm \sqrt{64 - 64}}{2}$$

$$= \frac{8}{2}$$

$$= 4$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x(x+9) = 4(2x+5)$

Solution

$$x^2 + 9x = 8x + 20$$

$$x^2 + x - 20 = 0$$

$$x = \frac{-1 \pm \sqrt{1+80}}{2}$$

$$= \frac{-1 \pm 9}{2}$$

$$= \left\{ \begin{array}{l} \frac{-1+9}{2} = 4 \\ \frac{-1-9}{2} = -5 \end{array} \right.$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $(x+1)^2 = 2(x+3)$

Solution

$$x^2 + 2x + 1 = 2x + 6$$

$$x^2 = 5$$

$$x = \pm\sqrt{5}$$

Exercise

Solve: $(x+1)^2 - 5(x+2) = 3x+7$

Solution

$$x^2 + 2x + 1 - 5x - 10 = 3x + 7$$

$$x^2 - 6x - 16 = 0$$

$$x = \frac{6 \pm \sqrt{36+64}}{2}$$

$$= \frac{6 \pm 10}{2}$$

$$= \left\{ \begin{array}{l} \frac{6+10}{2} = 8 \\ \frac{6-10}{2} = -2 \end{array} \right.$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x(8x+1) = 3x^2 - 2x + 2$

Solution

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

$$5x^2 + 3x - 2 = 0$$

$$x = \frac{-3 \pm \sqrt{9 + 40}}{10}$$

$$= \frac{-3 \pm 7}{2}$$

$$= \left\{ \begin{array}{l} \frac{-3+7}{10} = \frac{2}{5} \\ \frac{-3-7}{10} = -1 \end{array} \right\}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Exercise

Solve: $x^2 + 6x - 7 = 0$

Solution

$$1 + 6 - 7 = 0 \quad a + b + c = 0$$

$$\underline{x = 1, -7} \quad x_1 = 1, \quad x_2 = \frac{c}{a}$$

Exercise

Solve: $x^2 - 6x - 7 = 0$

Solution

$$1 - (-6) - 7 = 0 \quad a - b + c = 0$$

$$\underline{x = -1, 7} \quad x_1 = -1, \quad x_2 = -\frac{c}{a}$$

Exercise

Solve: $3x^2 + 4x - 7 = 0$

Solution

$$3 + 4 - 7 = 0 \quad a + b + c = 0$$

$$\underline{x = 1, -\frac{7}{3}} \quad x_1 = 1, \quad x_2 = \frac{c}{a}$$

Exercise

Solve: $3x^2 - 4x - 7 = 0$

Solution

$$3 - (-4) - 7 = 0 \quad a - b + c = 0$$

$$\underline{x = -1, \frac{7}{3}} \quad x_1 = -1, \quad x_2 = -\frac{c}{a}$$

Exercise

Solve: $3x^2 - x - 2 = 0$

Solution

$$3 - 1 - 2 = 0 \quad a + b + c = 0$$

$$\underline{x = 1, -\frac{2}{3}} \quad x_1 = 1, \quad x_2 = \frac{c}{a}$$

Exercise

Solve: $3x^2 + x - 2 = 0$

Solution

$$3 - 1 - 2 = 0 \quad a - b + c = 0$$

$$\underline{x = -1, \frac{2}{3}} \quad x_1 = -1, \quad x_2 = -\frac{c}{a}$$

Exercise

Solve: $2x^2 + 3x - 5 = 0$

Solution

$$2 + 3 - 5 = 0 \quad a + b + c = 0$$

$$\underline{x = 1, -\frac{5}{2}} \quad x_1 = 1, \quad x_2 = \frac{c}{a}$$

Exercise

Solve: $2x^2 - 3x - 5 = 0$

Solution

$$2 - (-3) - 5 = 0 \quad a + b + c = 0$$

$$\underline{x = -1, \frac{5}{2}} \quad x_1 = -1, \quad x_2 = -\frac{c}{a}$$

Exercise

$$\text{Solve: } x^2 - 3x - 4 = 0$$

Solution

$$1 - (-3) - 4 = 0 \quad a - b + c = 0$$

$$\underline{x = -1, 4} \quad x_1 = -1, \quad x_2 = -\frac{c}{a}$$

Exercise

$$\text{Solve: } x^2 + 3x - 4 = 0$$

Solution

$$1 + 3 - 4 = 0 \quad a + b + c = 0$$

$$\underline{x = 1, -4} \quad x_1 = 1, \quad x_2 = \frac{c}{a}$$

Exercise

$$\text{Solve: } x^2 + 2x + 1 = 0$$

Solution

$$1 - 2 + 1 = 0 \quad a - b + c = 0$$

$$\underline{x = -1, -1} \quad x_1 = -1, \quad x_2 = -\frac{c}{a}$$

Exercise

$$\text{Solve: } 4x^2 - x - 5 = 0$$

Solution

$$4 - (-1) - 5 = 0 \quad a - b + c = 0$$

$$\underline{x = -1, \frac{5}{4}} \quad x_1 = -1, \quad x_2 = -\frac{c}{a}$$

Exercise

Solve for the specified variable $A = \frac{\pi d^2}{4}$, for d

Solution

$$\frac{4}{\pi}A = \frac{4}{\pi} \frac{\pi d^2}{4}$$

$$4A = 4 \frac{\pi d^2}{4}$$

$$\frac{4A}{\pi} = d^2$$

$$4A = \pi d^2$$

$$d^2 = \frac{4A}{\pi}$$

$$\frac{4A}{\pi} = \frac{\pi}{\pi} d^2$$

$$d = \pm \sqrt{\frac{4A}{\pi}}$$

$$= \pm 2 \frac{\sqrt{A}}{\sqrt{\pi}}$$

$$= \pm 2 \frac{\sqrt{A}}{\sqrt{\pi}} \frac{\sqrt{\pi}}{\sqrt{\pi}}$$

$$= \pm \frac{2\sqrt{\pi A}}{\pi}$$

Exercise

Solve for the specified variable $rt^2 - st - k = 0$ ($r \neq 0$), for t

Solution

$$t = \frac{-(-s) \pm \sqrt{(-s)^2 - 4(r)(-k)}}{2(r)}$$

$$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$t = \frac{s \pm \sqrt{s^2 + 4rk}}{2r}$$