

p. 68 in your notebook

Find the x-intercepts by completing the square. Express solutions in simplest radical form, then round to the nearest hundredth.

Completing the square
TO SOLVE
(x₁, 0)
(x₂, 0)

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

$$0 = (x^2 + 2x + 1) - 1 - 1$$

$$\left(\frac{2}{2}\right)^2 = (1)^2 = 1$$

$$0 = (x+1)^2 - 2$$

$$\sqrt{2} = \sqrt{(x+1)^2}$$

$$\pm\sqrt{2} = x+1$$

$$\underline{-1} \quad \underline{-1}$$
$$-1 \pm \sqrt{2} = x \quad \text{exact solutions}$$

$$0.41 = x$$

$$-2.41 = x$$

approx.

If I avg.

my x-int's

- what is the value?
- what is it telling me?

Replace
 $y=0$

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

$$0 = \frac{2x^2}{2} + \frac{6x}{2} + \frac{5}{2}$$

$$0 = x^2 + 3x + \frac{5}{2}$$

$$0 = \left(x^2 + 3x + \frac{9}{4}\right) + \frac{5 \cdot 2}{2 \cdot 2} - \frac{9}{4}$$

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

$$0 = \left(x + \frac{3}{2}\right)^2 + \frac{1}{4}$$

$$-\frac{1}{4}$$

$$-\frac{1}{4}$$

$$\sqrt{-\frac{1}{4}} = \sqrt{\left(x + \frac{3}{2}\right)^2}$$

$$\pm \sqrt{-\frac{1}{4}}$$

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

$$\pm \frac{\sqrt{-1}}{\sqrt{4}} = \pm \frac{1}{2}i$$

Try this one on your own!

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

Answer

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

$$x^2 - 5x + \frac{25}{4} = -3 + \frac{25}{4}$$

$$\begin{aligned} & -\frac{3}{1} \cdot \frac{4}{4} + \frac{25}{4} \\ & -\frac{12}{4} + \frac{25}{4} \\ & \frac{13}{4} \end{aligned}$$

$$\sqrt{\left(x - \frac{5}{2}\right)^2} = \pm \sqrt{\frac{13}{4}}$$

$$x - \frac{5}{2} = \pm \frac{\sqrt{13}}{2}$$

$$x = \frac{5}{2} \pm \frac{\sqrt{13}}{2} =$$

$$\boxed{\frac{5 \pm \sqrt{13}}{2}}$$

exact

approximate

4.30 &

0.70

Try these for extra practice

$$\textcircled{4} y = x^2 - 4x + 2$$

move the constant over first.

$$\boxed{5} y = -x^2 + 3x - 5$$

$$\boxed{6} y = 3x^2 + 9x - 6$$

$$\textcircled{4} 0 = x^2 - 4x + 2$$

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

$$\left(-\frac{4}{2}\right)^2 = (-2)^2 = 4$$

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

$$\begin{array}{r} +\sqrt{2} = x-2 \\ +2 \end{array}$$

$$2 \pm \sqrt{2} = x \text{ exact.}$$

approx. 3.41, 0.59

Answers

$$4. y = x^2 - 4x + 2$$

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

$$\sqrt{(x-2)^2} = \sqrt{2}$$

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

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

$$6. y = 3x^2 + 9x - 6$$

$$\frac{3x^2 + 9x}{3} = \frac{6}{3}$$

$$x^2 + 3x + \frac{9}{4} = 2 + \frac{9}{4}$$

$$\sqrt{\left(x + \frac{3}{2}\right)^2} = \sqrt{\frac{17}{4}} \rightarrow$$

$$5. y = -x^2 + 3x - 5$$

$$x^2 - 3x + \frac{9}{4} = -5 + \frac{9}{4}$$

$$\left(x - \frac{3}{2}\right)^2 = -\frac{11}{4}$$

$$x - \frac{3}{2} = \pm \frac{i\sqrt{11}}{2}$$

$$x = \frac{3 \pm i\sqrt{11}}{2}$$

$$x + \frac{3}{2} = \pm \frac{\sqrt{17}}{2}$$

$$x = -\frac{3}{2} \pm \frac{\sqrt{17}}{2} =$$

$$\boxed{\frac{-3 \pm \sqrt{17}}{2}}$$

put on p. 69 in your notebook

Solve the equation by completing the square.

$$ax^2 + bx + c = 0$$

$$\begin{aligned} x^2 + 6x + 9 \\ \left(\frac{6}{2}\right)^2 = (3)^2 = 9 \\ (x+3)^2 \end{aligned}$$

$$\begin{aligned} x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} &= -\frac{c}{a} + \frac{b^2}{4a^2} \\ \left(\frac{b \text{ term}}{2}\right)^2 &= \left(\frac{b}{2a}\right)^2 = \frac{b^2}{4a^2} \\ \sqrt{\left(x + \frac{b}{2a}\right)^2} &= \sqrt{\frac{-4ac + b^2}{4a^2}} \end{aligned}$$

LCD

square root both sides

$$\begin{array}{r} x + \frac{b}{2a} = \pm \frac{\sqrt{b^2 - 4ac}}{2a} \\ -\frac{b}{2a} \quad -\frac{b}{2a} \end{array}$$

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

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

Solve each quadratic equation using the quadratic formula. Write your answers in simplest radical form. *Quadratic Formula*

$$2x^2 + 7x - 3 = 0$$

$$\begin{aligned} a &= 2 \\ b &= 7 \\ c &= -3 \end{aligned}$$

$$x = \frac{-7 \pm \sqrt{49 - 4(2)(-3)}}{2(2)}$$

$$x = \frac{-7 \pm \sqrt{49 + 24}}{4}$$

$$x = \frac{-7 \pm \sqrt{73}}{4}$$

if asked
x-int's in exact values.

$$\left(-\frac{7}{4} + \frac{\sqrt{73}}{4}, 0\right) \left(-\frac{7}{4} - \frac{\sqrt{73}}{4}, 0\right)$$

$$3x^2 - 2x - 1 = 0$$

$$\begin{aligned} a &= 3 \\ b &= -2 \\ c &= -1 \end{aligned}$$

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

$$x = \frac{2 \pm \sqrt{4 + 12}}{6}$$

$$x = \frac{2 \pm \sqrt{16}}{6}$$

$$x = \frac{2 \pm 4}{6} \begin{matrix} \nearrow \frac{2+4}{6} \\ \searrow \frac{2-4}{6} \end{matrix}$$

$$x = 1$$

$$x = -\frac{1}{3}$$