Review Exercise Set 1

Exercise 1: Solve by using the completing the square method.

\[ x^2 - 4x - 21 = 0 \]

Exercise 2: Solve by using the completing the square method.

\[ a^2 + 2a - 5 = 0 \]

Exercise 3: Solve by using the completing the square method.

\[ n^2 + 12n + 36 = 0 \]
Exercise 4: Solve by using the completing the square method.

\[ 2x^2 - 5x = 7 \]

Exercise 5: Solve by using the completing the square method.

\[ 2r^2 - 6r = 20 \]
Review Exercise Set 1 Answer Key

Exercise 1: Solve by using the completing the square method.

\[ x^2 - 4x - 21 = 0 \]

Rewrite the equation with the constant on the right side of the equation

\[ x^2 - 4x = 21 \]

Take half of the coefficient for \( x \), square it, and add it to both sides of the equation

\[ \frac{1}{2}(-4) = -2; \quad (-2)^2 = 4 \]

\[ x^2 - 4x + 4 = 21 + 4 \]
\[ x^2 - 4x + 4 = 25 \]

Factor the perfect square trinomial

\[ (x - 2)^2 = 25 \]

Use the square root property

\[ x - 2 = \pm\sqrt{25} \]
\[ x - 2 = \pm 5 \]
\[ x = 2 \pm 5 \]

\[ x = 2 + 5 \quad \text{or} \quad x = 2 - 5 \]
\[ x = 7 \quad \quad x = -3 \]

7 and -3 are the solutions for the equation

Exercise 2: Solve by using the completing the square method.

\[ a^2 + 2a - 5 = 0 \]

Rewrite the equation with the constant on the right side of the equation

\[ a^2 + 2a = 5 \]
Exercise 2 (Continued):

Take half of the coefficient for x, square it, and add it to both sides of the equation

\[ \frac{1}{2}(2) = 1; \quad (1)^2 = 1 \]

\[ a^2 + 2a + 1 = 5 + 1 \]
\[ a^2 + 2a + 1 = 6 \]

Factor the perfect square trinomial

\[ (a + 1)^2 = 6 \]

Use the square root property

\[ a + 1 = \pm \sqrt{6} \]
\[ a = -1 \pm \sqrt{6} \]

\[ a = -1 + \sqrt{6} \quad \text{or} \quad a = -1 - \sqrt{6} \]

\(-1 + \sqrt{6}\) and \(-1 - \sqrt{6}\) are the solutions for the equation

Exercise 3: Solve by using the completing the square method.

\[ n^2 + 12n + 36 = 0 \]

\[ \frac{1}{2}(12) = 6; \quad (6)^2 = 36 \]

The polynomial already has the necessary constant in order to factor it as a perfect square trinomial

\[ (n + 6)^2 = 0 \]
\[ n + 6 = \pm \sqrt{0} \]
\[ n + 6 = 0 \]
\[ n = -6 \]

-6 is the solution for the equation
Exercise 4: Solve by using the completing the square method.

\[ 2x^2 - 5x = 7 \]

Factor 2 from the left side of the equation so that the leading coefficient inside the parenthesis is 1

\[ 2\left(x^2 - \frac{5}{2}x\right) = 7 \]

Take half of the coefficient for \( x \), square it, and add it to both sides of the equation

\[ \frac{1}{2}\left(\frac{5}{2}\right) = \frac{5}{4}; \quad \left(\frac{5}{4}\right)^2 = \frac{25}{16} \]

Since 2 is being multiplied to each term in the parenthesis on the left side, we must multiply the fraction \( \frac{25}{16} \) by 2 when we add it to the right side

\[ 2\left(x^2 - \frac{5}{2}x + \frac{25}{16}\right) = 7 + 2\left(\frac{25}{16}\right) \]

\[ 2\left(x^2 - \frac{5}{2}x + \frac{25}{16}\right) = \frac{56}{8} + \frac{25}{8} \]

\[ 2\left(x^2 - \frac{5}{2}x + \frac{25}{16}\right) = \frac{81}{8} \]

Factor the perfect square trinomial in the parenthesis

\[ 2\left(x - \frac{5}{4}\right)^2 = \frac{81}{8} \]

Solve for \( x \)

\[ \frac{1}{2} \times 2\left(x - \frac{5}{4}\right)^2 = \frac{1}{2} \times \frac{81}{8} \]

\[ \left(x - \frac{5}{4}\right)^2 = \frac{81}{16} \]

\[ x - \frac{5}{4} = \pm \frac{9}{4} \]

\[ x = \frac{5}{4} \pm \frac{9}{4} \]

\[ x = \frac{5 \pm 9}{4} \]
Exercise 4 (Continued):

\[
x = \frac{5}{4} + \frac{9}{4} \quad \text{or} \quad x = \frac{5}{4} - \frac{9}{4}
\]
\[
x = \frac{14}{4} \quad \text{or} \quad x = -\frac{4}{4}
\]
\[
x = \frac{7}{2} \quad \text{or} \quad x = -1
\]

-1 and \( \frac{7}{2} \) are the solutions for the equation

Exercise 5: Solve by using the completing the square method.

\[
2r^2 - 6r = 20
\]
\[2\left(r^2 - 3r\right) = 20\]

\[
\frac{1}{2}\left(-3\right) = -\frac{3}{2}; \quad \left(-\frac{3}{2}\right)^2 = \frac{9}{4}
\]

\[
2\left(r^2 - 3r + \frac{9}{4}\right) = 20 + 2\left(\frac{9}{4}\right)
\]
\[
2\left(r^2 - 3r + \frac{9}{4}\right) = \frac{40}{2} + \frac{9}{2}
\]
\[
2\left(r - \frac{3}{2}\right)^2 = \frac{49}{2}
\]
\[
\frac{1}{2} \times 2\left(r - \frac{3}{2}\right)^2 = \frac{1}{2} \times \frac{49}{2}
\]
\[
\left(r - \frac{3}{2}\right)^2 = \frac{49}{4}
\]
\[
r - \frac{3}{2} = \pm \sqrt{\frac{49}{4}}
\]
\[
r = \frac{3}{2} \pm \frac{7}{2}
\]
Exercise 5 (Continued):

\[
\begin{align*}
  r &= \frac{3}{2} + \frac{7}{2} \quad \text{or} \quad r = \frac{3}{2} - \frac{7}{2} \\
  r &= \frac{10}{2} \quad \quad \quad \quad \quad \quad \quad \quad \quad r = \frac{-4}{2} \\
  r &= 5 \quad \quad \quad \quad \quad \quad \quad \quad \quad r = -2
\end{align*}
\]

-2 and 5 are the solutions for the equation