

Worksheet #17

$$\begin{aligned}
 1) \quad x^2 + 8x &= -14 \\
 x^2 + 8x + 16 &= -14 + 16 \\
 (x + 4)^2 &= 2 \\
 x + 4 &= \pm \sqrt{2} \\
 x &= -4 \pm \sqrt{2}
 \end{aligned}$$

$$\begin{aligned}
 3) \quad x^2 - 10x &= -22 \\
 x^2 - 10x + 25 &= -22 + 25 \\
 (x - 5)^2 &= 3 \\
 x - 5 &= \pm \sqrt{3} \\
 x &= 5 \pm \sqrt{3}
 \end{aligned}$$

$$\begin{aligned}
 4) \quad x^2 + 12x &= 0 \\
 x^2 + 12x + 36 &= 36 \\
 (x + 6)^2 &= 36 \\
 x + 6 &= \pm 6 \\
 x &= \{0, -12\}
 \end{aligned}$$

$$\begin{aligned}
 6) \quad x^2 + 3x &= 1 \\
 x^2 + 3x + \frac{9}{4} &= 1 + \frac{9}{4} \\
 (x + \frac{3}{2})^2 &= \frac{4}{4} + \frac{9}{4} \\
 x + \frac{3}{2} &= \pm \sqrt{\frac{13}{4}} \\
 x &= \frac{-3 \pm \sqrt{13}}{2}
 \end{aligned}$$

$$\begin{aligned}
 8) \quad |x - 10| &= x^2 - 10x \\
 x - 10 &= x^2 - 10x \quad -x + 10 = x^2 - 10x \\
 x^2 - 11x + 10 &= 0 \quad x^2 - 9x - 10 = 0 \\
 (x - 10)(x - 1) &= 0 \quad (x - 10)(x + 1) = 0 \\
 x &= \{10, 1\}, x = \{10, -1\}
 \end{aligned}$$

$$\begin{aligned}
 \text{ch: } |10 - 10| &= 100 - 100 \\
 0 &= 0 \\
 |1 - 10| &= 1 - 10 \\
 9 &\neq -9 \\
 |-1 - 10| &= 1 + 10 \\
 11 &= 11 \\
 x &= \{10, -1\}
 \end{aligned}$$

$$\begin{aligned}
 10) \quad y &= x^3 + 5 & x - 5 &= y^3 \\
 \text{inv: } x &= y^3 + 5 & f^{-1}(x) &= \sqrt[3]{x - 5}
 \end{aligned}$$

Answers

$$\begin{aligned}
 2) \quad 4x^2 - 4x &= 99 \\
 4(x^2 - x) &= 99 \\
 x^2 - x &= \frac{99}{4} \\
 x^2 - x + \frac{1}{4} &= \frac{99}{4} + \frac{1}{4} \\
 (x - \frac{1}{2})^2 &= \frac{100}{4} \\
 (x - \frac{1}{2})^2 &= 25 \\
 x - \frac{1}{2} &= \pm 5 \\
 x &= \frac{1}{2} \pm 5
 \end{aligned}$$

$$\begin{aligned}
 5) \quad 9x^2 - 18x &= -3 \\
 9(x^2 - 2x) &= -3 \\
 x^2 - 2x &= -\frac{1}{3} \\
 x^2 - 2x + 1 &= 1 - \frac{1}{3} \\
 (x - 1)^2 &= \frac{2}{3} \\
 x - 1 &= \pm \sqrt{\frac{2}{3}} \\
 x &= 1 \pm \sqrt{\frac{2}{3}} = 1 \pm (\sqrt{6})/3
 \end{aligned}$$

$$\begin{aligned}
 7) \quad -\sqrt{26 - 11x} &= x - 4 \\
 26 - 11x &= x^2 - 8x + 16 \\
 0 &= x^2 + 3x - 10 \\
 (x + 5)(x - 2) &= 0 \\
 x &= \{-5, 2\} \\
 \text{ch: } -\sqrt{26 + 55} + 4 &= -5 \\
 -\sqrt{81} + 4 &= -5 \\
 -9 + 4 &= -5 \\
 -5 &= -5 \\
 -\sqrt{26 - 22} + 4 &= 2 \\
 -\sqrt{4} + 4 &= 2 \\
 -2 + 4 &= 2 \\
 2 &= 2
 \end{aligned}$$

$$\begin{aligned}
 9) \quad y &= \frac{4x + 7}{5} \\
 \text{inv: } x &= \frac{4y + 7}{5} \\
 5x &= 4y + 7 \\
 5x - 7 &= 4y \\
 f^{-1}(x) &= \frac{5x - 7}{4}
 \end{aligned}$$