

## 1-4 Solving Equations by Chunking Practice

Use algebraic reasoning to solve the following equations for the given variable. Show all work.

Use your calculator ONLY for equations involving  $e$  and *natural log*.

For the trigonometric equations, find solutions  $0 \leq \theta \leq 2\pi$ .

1.  $x^6 + 7x^3 = 8$

$$x^6 + 7x^3 - 8 = 0$$

$$(x^3 + 8)(x^3 - 1) = 0$$

$$x^3 = -8 \quad x^3 = 1 = 0$$

$$x = -2 \quad x^3 = 1$$

$$x = 1$$

2.  $9x^4 - 3x^2 = 2$

$$9x^4 - 3x^2 - 2 = 0$$

$$(3x^2 + 1)(3x^2 - 2) = 0$$

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

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

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

$$x = \sqrt{\frac{2}{3}}$$

No solution

3.  $x - 3\sqrt{x} + 2 = 0$

$$(\sqrt{x} - 2)(\sqrt{x} - 1) = 0$$

$$\sqrt{x} - 2 = 0 \quad \sqrt{x} - 1 = 0$$

$$\sqrt{x} = 2 \quad \sqrt{x} = 1$$

$$x = 4 \quad x = 1$$

4.  $e^{4x} + 35 = 12e^{2x}$

$$e^{4x} - 12e^{2x} + 35 = 0$$

$$(e^{2x} - 5)(e^{2x} - 7) = 0$$

$$e^{2x} - 5 = 0$$

$$e^{2x} - 7 = 0$$

$$e^{2x} = 5$$

$$e^{2x} = 7$$

$$x = \frac{\ln 5}{2}$$

$$x = \frac{\ln 7}{2}$$

5.  $2\cos x + 2 = 0$

$$2(\cos x + 1) = 0$$

$$\cos x + 1 = 0$$

$$\cos x = -1$$

$$x = \pi$$

6.  $n^{10} - 5n^6 + 4n^2 = 0$

$$n^2(n^8 - 5n^4 + 4) = 0$$

$$n^2(n^4 - 4)(n^4 - 1) = 0$$

$$n = 0, n = \sqrt{4}, n = 1$$

$$7. (m+5)^4 - 5 = m$$

$$u = m+5 \quad (m+5)^4 - (m+5) = 0$$

$$u^4 - u = 0$$

$$u(u^3 - 1) = 0$$

$$u = 0 \quad u = 1$$

$$m+5 = 0 \quad m+5 = 1$$

$$m = -5 \quad m = -4$$

$$9. (\sqrt[3]{x})^2 + 2 \cdot \sqrt[3]{x} = 3$$

$$(\sqrt[3]{x})^2 + 2\sqrt[3]{x} - 3 = 0$$

$$(\sqrt[3]{x} - 1)(\sqrt[3]{x} + 3) = 0$$

$$\sqrt[3]{x} - 1 = 0 \quad \sqrt[3]{x} + 3 = 0$$

$$\sqrt[3]{x} = 1 \quad \sqrt[3]{x} = -3$$

$$x = 1 \quad x = -27$$

$$11. (\log_5(x-1))^2 - \log_5(x-1) = 2$$

$$u = \log_5(x-1)$$

$$u^2 - u - 2 = 0$$

$$(u+1)(u-2) = 0$$

$$u = -1 \quad u = 2$$

$$\log_5(x-1) = -1 \quad \log_5(x-1) = 2$$

$$8. (x^3 + 2x^2) - x - 2 = 0$$

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

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

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

$$x = -2 \quad x = \pm 1$$

$$10. \sin^3 \theta - \sin^2 \theta = 2 \sin \theta$$

$$\sin^3 \theta - \sin^2 \theta - 2 \sin \theta = 0$$

$$\sin \theta (\sin^2 \theta - \sin \theta - 2) = 0$$

$$\sin \theta (\sin \theta - 2)(\sin \theta + 1) = 0$$

$$\sin \theta = 0 \quad \left| \quad \sin \theta = 2 \quad \left| \quad \sin \theta = -1 \right. \right.$$

$$\theta = 0, \pi \quad \left| \quad \text{No solution} \quad \left| \quad \theta = \frac{3\pi}{2} \right. \right.$$

$$12. x^3 - 3x^2 - 4x + 12 = 0$$

$$x^2(x-3) - 4(x-3) = 0$$

$$(x-3)(x^2-4) = 0$$

$$(x-3)(x+2)(x-2) = 0$$

$$x = 3, \quad x = \pm 2$$