

Solve the equation.

1.  $|3x-2|+3=7$

$$|3x-2|=4$$

$$3x-2=4 \text{ or } 3x-2=-4$$

$$3x=6$$

$$3x=-2$$

$$x=2$$

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

2.  $|x-2|+5=5$

$$|x-2|=0$$

$$x-2=0$$

$$x=2$$

3.  $4x^4+10x^3=6x^2+15x$

$$4x^4+10x^3-6x^2-15x=0$$

$$x((4x^3+10x^2)+(-6x^2-15))=0$$

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

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

$$x=0, \frac{\pm\sqrt{6}}{2}, \frac{-5}{2}$$

4.  $y^{4/3}=-3y$

$$y^{4/3}+3y=0$$

$$y(y^{1/3}+3)=0$$

$$y=0 \text{ or } y^{1/3}=-3$$

$$y^{1/3}(-3) = (-3)^3$$

$$y=-27$$

5.  $2+\sqrt[3]{1-5t}=0$

$$(\sqrt[3]{1-5t})^3 = (-2)^3$$

$$1-5t=-8$$

$$-5t=-9$$

$$t = \frac{9}{5}$$

6.  $(\sqrt[4]{2x^2-1})^4 = (x)^4$

$$2x^2-1=x^4$$

$$0=x^4-2x^2+1$$

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

$$x=1 \text{ or } x=-1$$

7.  $3\sqrt{2x-3}+2\sqrt{7-x}=11$

$$(3\sqrt{2x-3})^2 = (11-2\sqrt{7-x})^2$$

$$9(2x-3) = 121 - 44\sqrt{7-x} + 4(7-x)$$

$$18x-27 = 121 - 44\sqrt{7-x} + 28-4x$$

$$18x-27 = 149 - 44\sqrt{7-x} - 4x$$

$$\frac{22x-176}{-44} = \frac{-44\sqrt{7-x}}{-44}$$

$$\left(-\frac{1}{2}x+4\right)^2 = (\sqrt{7-x})^2$$

$$\frac{1}{4}x^2 - 4x + 16 = 7-x$$

$$x^2 - 12x + 36 = 0$$

$$(x-6)^2 = 0 \quad x=6$$

8.  $x=3+\sqrt{5x-9}$

$$(x-3)^2 = (\sqrt{5x-9})^2$$

$$x^2-6x+9=5x-9$$

$$x^2-11x+18=0$$

$$(x-9)(x-2)=0$$

$$x=9 \text{ or } x=2$$

9.  $(\sqrt{7-2x}-\sqrt{5+x})^2 = (\sqrt{4+3x})^2$

$$7-2x-2\sqrt{(7-2x)(5+x)}+5+x=4+3x$$

$$12-x-2\sqrt{(7-2x)(5+x)}=4+3x$$

$$-2\sqrt{(7-2x)(5+x)} = -8+4x$$

$$\frac{-2}{-2} \sqrt{(7-2x)(5+x)} = \frac{-8+4x}{-2}$$

$$(\sqrt{(7-2x)(5+x)})^2 = (4-2x)^2$$

$$35-3x-2x^2 = 16-16x+4x^2$$

$$0=6x^2-13x-19$$

$$0=(x+1)(6x-19)$$

$$x=-1 \text{ or } x=\frac{19}{6}$$

$$11. (2\sqrt{x} - \sqrt{x-3})^2 = (\sqrt{5+x})^2$$

$$4x - 4\sqrt{x(x-3)} + x - 3 = 5 + x$$

$$5x - 4\sqrt{x(x-3)} - 3 = 5 + x$$

$$\frac{-4\sqrt{x(x-3)}}{-4} = \frac{-4x + 8}{-4}$$

$$(\sqrt{x(x-3)})^2 = (x-2)^2$$

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

$$x^2 - 3x = x^2 - 4x + 4$$

$$x = 4$$

$$12. (\sqrt{1+4\sqrt{x}})^2 = (\sqrt{x+1})^2$$

$$1+4\sqrt{x} = x+2\sqrt{x}+1$$

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

$$4x = x^2$$

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

$$0 = x(x-4)$$

$$x=0 \text{ or } x=4$$

$$13. 2x^4 - 10x^2 + 8 = 0$$

$$2(x^4 - 5x^2 + 4) = 0$$

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

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

$$14. 36x^4 - 13x^2 + 1 = 0$$

$$(4x^2 - 1)(9x^2 - 1) = 0$$

$$x^2 = \frac{1}{4} \text{ or } x^2 = \frac{1}{9}$$

$$x^2 = 4 \quad x^2 = 9$$

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

$$15. 2y^{1/3} - 3y^{1/6} + 1 = 0$$

$$(2y^{1/6} - 1)(y^{1/6} - 1) = 0$$

$$2y^{1/6} - 1 = 0 \text{ or } y^{1/6} - 1 = 0$$

$$y^{1/6} = \frac{1}{2} \quad y^{1/6} = 1$$

$$y = \frac{1}{64} \quad y = 1$$

$$16. 27x^3 = (x+5)^3$$

$$\frac{27x^3}{x^3} = \frac{(x+5)^3}{x^3}$$

$$\sqrt[3]{27} = \sqrt[3]{\frac{(x+5)^3}{x^3}}$$

$$3 = \frac{x+5}{x}$$

$$3x = x+5$$

$$2x = 5$$

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

Find the real solutions of the equation.

$$17. (a) x^{5/3} = 32$$

$$x = (\sqrt[3]{32})^{3/5}$$

$$x = 2^3$$

$$x = 8$$

$$(b) x^{4/3} = 16$$

$$x = (\sqrt[3]{16})^{3/4}$$

$$x = \pm 2^3$$

$$x = \pm 8$$

$$(c) x^{2/3} = -36$$

$$x = (\sqrt[3]{-36})^3$$

$$\text{no reals}$$

$$(d) x^{3/4} = 125$$

$$x = (\sqrt[4]{125})^4$$

$$x = 5^4$$

$$x = 625$$

$$(e) x^{3/2} = -27$$

$$x = (\sqrt[2]{-27})^2$$

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

$$x \neq 9$$

$$\emptyset$$