

Evans

Name: Key

Solving review

Solve. Give exact answers in simplest form. (no rounding) Give both real and imaginary solutions.

1.) $x^2 - 8x - 20 = 0$
 $(x-10)(x+2) = 0$
 $x = 10$ $x = -2$

3.) $4x^2 - 4x - 17 = 0$
 $x = \frac{4 \pm \sqrt{16 - 4(4)(-17)}}{8}$
 $x = \frac{4 \pm \sqrt{288}}{8} = \frac{4 \pm \sqrt{2 \cdot 144}}{8} = \frac{4 \pm 12\sqrt{2}}{8}$
 $= \frac{1 \pm 3\sqrt{2}}{2}$

5.) $\sqrt{(3x-2)^2} = \sqrt{121}$
 $3x-2 = \pm 11$
 $3x-2 = 11$ $3x-2 = -11$
 $3x = 13$ $3x = -9$
 $x = \frac{13}{3}$ $x = -3$

7.) $x^3 - 4x^2 - 5x = 0$
 $x(x-5)(x+1) = 0$
 $x = 0$ $x = 5$ $x = -1$

9.) $x^4 = 2x^3 - x^2$
 $x^4 - 2x^3 + x^2 = 0$
 $x^2(x^2 - 2x + 1) = 0$
 $x^2(x-1)^2 = 0$
 $x = 0$ $x = 1$

11.) $x^3 + 5x^2 = 4x + 20$ Factor by Grouping
 $x^3 + 5x^2 - 4x - 20 = 0$
 $x^2(x+5) - 4(x+5) = 0$
 $(x+5)(x^2 - 4) = 0$
 $(x+5)(x+2)(x-2) = 0$
 $x = -5$ $x = -2$ $x = 2$

2.) $x^2 + 10x + 35 = 0$
 $x^2 + 10x = -35$
 $x^2 + 10x + 25 = -35 + 25$
 $\sqrt{(x+5)^2} = \sqrt{-10}$
 $x+5 = \pm i\sqrt{10}$
 $x = -5 \pm i\sqrt{10}$

4.) $5x^2 + 2 = 5x$
 $5x^2 - 5x + 2 = 0$
 $x = \frac{5 \pm \sqrt{25 - 4(5)(2)}}{10} = \frac{5 \pm \sqrt{-15}}{10}$
 $x = \frac{5 \pm i\sqrt{15}}{10}$

6.) $x^2 = 6x - 9$
 $x^2 - 6x + 9 = 0$
 $(x-3)^2 = 0$
 $x = 3$

8.) $x^3 - 8 = 0$
 $(x-2)(x^2 + 2x + 4) = 0$
 $x = 2$ $x^2 + 2x + 4 = -4 + 4$
 $\sqrt{(x+1)^2} = \sqrt{-3}$
 $x+1 = \pm i\sqrt{3}$
 $x = -1 \pm i\sqrt{3}$

10.) $x^4 - x^3 + 27x - 27 = 0$
 $x^3(x-1) + 27(x-1) = 0$
 $(x-1)(x^3 + 27) = 0$
 $(x-1)(x+3)(x^2 - 3x + 9) = 0$
 $x = 1$ $x = -3$ $x = \frac{3 \pm \sqrt{9 - 4(1)(9)}}{2}$

12.) $36x + 9x^2 = x^4 + 4x^3$
 $0 = x^4 + 4x^3 - 9x^2 - 36x$
 $0 = x(x^3 + 4x^2 - 9x - 36)$
 $0 = x(x^2(x+4) - 9(x+4))$
 $0 = x(x+4)(x^2 - 9)$
 $0 = x(x+4)(x+3)(x-3)$
 $x = 3 \pm \sqrt{-27}$
 $x = \frac{3 \pm 3i\sqrt{3}}{2}$
 $x = 0$ $x = -4$ $x = -3$ $x = 3$

$$13.) x^4 - 7x^2 = 8$$

$$x^4 - 7x^2 - 8 = 0$$

$$(x^2 - 8)(x^2 + 1) = 0$$

$$\sqrt{x^2} = \sqrt{8} \quad \sqrt{x^2} = \sqrt{1}$$

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

$$15.) 250x^5 = 16x^2$$

$$250x^5 - 16x^2 = 0$$

$$2x^2(125x^3 - 8) = 0$$

$$2x^2(5x - 2)(25x^2 + 10x + 4) = 0$$

$$x = 0 \quad x = \frac{2}{5} \quad x = \frac{-10 \pm \sqrt{100 - 4(25)(4)}}{50} = \frac{-10 \pm \sqrt{-300}}{50}$$

$$= \frac{-10 \pm 10i\sqrt{3}}{50}$$

$$17.) 8x^2 = 7 - 10x$$

$$8x^2 + 10x - 7 = 0$$

$$(2x - 1)(4x + 7) = 0$$

$$x = \frac{1}{2}$$

$$x = -\frac{7}{4}$$

$$x = \frac{-1 \pm i\sqrt{3}}{5}$$

$$19.) \frac{2x^5}{2} + \frac{8x}{2} = \frac{10x^3}{2}$$

$$x^5 - 5x^3 + 4x = 0$$

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

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

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

$$x = 0 \quad x = -2 \quad x = 2 \quad x = -1 \quad x = 1$$

$$21.) 6x^4 - 2x^3 = 2x - 6x^2$$

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

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

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

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

$$x = 0 \quad x = \frac{1}{3} \quad x^2 + 1 = 0$$

$$23.) \frac{2x^2}{2} = \frac{18}{2}$$

$$\sqrt{x^2} = \sqrt{9}$$

$$x = \pm 3$$

$$x = \pm i$$

$$25.) x^3 + 6x^2 - 4x - 24 = 0$$

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

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

$$(x+6)(x+2)(x-2) = 0$$

$$x = -6 \quad x = -2 \quad x = 2$$

$$14.) 3x^4 + 24x = 0$$

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

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

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

$$\sqrt{(x-1)^2} = \sqrt{-3}$$

$$x-1 = \pm i\sqrt{3}$$

$$16.) 3x^2 = 12x - 15$$

$$3x^2 - 12x + 15 = 0$$

$$3(x^2 - 4x + 5) = 0$$

$$x^2 - 4x + 5 = -5 + 4$$

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

$$x-2 = \pm i$$

$$x = 2 \pm i$$

$$18.) (4x+4)^2 = \sqrt{-16}$$

$$4x+4 = \pm 4i$$

$$x+1 = \pm i$$

$$x = -1 \pm i$$

$$20.) 2x^3 - 3x^2 = 12 - 8x$$

$$2x^3 - 3x^2 + 8x - 12 = 0$$

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

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

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

$$x^2 + 4 = 0$$

$$x = \pm 2i$$

$$22.) 4x^3 - 16x = 0$$

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

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

$$x = 0$$

$$x = 2$$

$$x = -2$$

$$24.) 3x^4 - 12x^2 - 36 = 0$$

$$3(x^4 - 4x^2 - 12) = 0$$

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

$$x^2 - 6 = 0 \quad x^2 + 2 = 0$$

$$\sqrt{x^2} = \sqrt{6}$$

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

$$x = \pm \sqrt{6}$$

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