

To receive full credit, show all steps and present the exact value of solutions.

- Find the average of  $-\frac{2}{3}$ ,  $3\frac{1}{6}$ , 4, and  $-\frac{1}{2}$ .  $\frac{3}{2}$
- Simplify each of the following expressions. Show all steps.

(a)  $\sqrt{(-1)^4 - 2 \cdot 3^2 \div (-2) \cdot 6 + (-3)^2} = 8$

(b)  $\left(3\frac{3}{5}\right) \div \left(1\frac{1}{3}\right) + \frac{3}{10} = 3$

(c)  $|-3^2 + 3 - |(-6)^2 + (-2)^3| - 2| + 1 = 37$

(d)  $(x + 6)(x^2 - 6x + 36) = x^3 + 216$

(e)  $\frac{20 - 5x^2}{6x^2 + 3x^3} = -\frac{5(x - 2)}{3x^2}$

(f)  $\frac{2x - 5}{5 - 2x} = -1$

- Perform the indicated operations.

(a)  $\left(2x^3 - 4x^2 + \frac{1}{2}x - 5\right) - \left(-x^3 + 4x^2 + \frac{1}{2}x - 4\right) = 3x^3 - 8x^2 - 1$

(b)  $(p - 1)(p + p^2 + p^3 + p^4 + 1) = p^5 - 1$

(c)  $(x - 1)^2 - 2x(x - 3) - (2x + 1)^2 = -5x^2$

- Factor completely each of the following expressions.

(a)  $2ax^2 - 18ay^2 - bx^2 + 9by^2 = (2a - b)(x + 3y)(x - 3y)$

(b)  $600ab^2 - 6ab^4 = -6ab^2(b - 10)(b + 10)$

(c)  $(3a - b)^2 - (3a + b)^2 = -12ab$

(d)  $60st^2 - 44st^2x + 8st^2x^2 = 4st^2(x - 3)(2x - 5)$

(e)  $(2x - 1)^2 - 9 = 4(x + 1)(x - 2)$

(f)  $a^4 - 16 = (a - 2)(a + 2)(a^2 + 4)$

- Solve each of the following equations. Make sure to check your solutions.

(a)  $\frac{2x + 1}{3} - \frac{1 - 5x}{7} = 2x - 6$  10

(b)  $15x^3 = 55x^2 + 20x$  4, 0,  $-\frac{1}{3}$

(c)  $5(2x - 3) - 3(4x - 7) = -2x$  no solution

(d)  $\frac{2}{3}x - \frac{3}{5} = 3\frac{2}{5}$  6

(e)  $7 - (2x - 1)(x + 5) = (3 - x)(2x + 7) - 17$  1

(f)  $3x^3 = 75x$  -5, 0, 5

6. Word Problems.

(a) The difference between two numbers is 7, their sum is 93. Find these numbers. 43 and 50

(b) Ann is four years younger than Tina. How old is Ann if the sum of their ages is 62? 29

(c) The difference between two numbers is 7, their product is 228. Find these numbers. 12, 19 and -19, -12

(d) One side of a rectangle is 4 in shorter than 3 times the other side. Find the sides of the rectangle if its perimeter is 48 in. 7 in by 17 in

(e) One side of a rectangle is 4 in shorter than 3 times the other side. Find the sides of the rectangle if its area is 319 in<sup>2</sup>. 11 in by 29 in

7. Consider the graph of the equation  $x^2 - 2y^2 + y + 15 = -5x$ . For each point given, determine if it is on the graph of the equation or not.

(a) (0, 3) yes

(b) (1, -2) no

(c) (1, -3) yes