

1. Find the real solutions, if any, of each equation.

(a)  $\frac{1-3x}{4} = \frac{x+6}{3} + \frac{1}{2}$

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

(c)  $3x^4 + 4x^2 + 1 = 0$

(d)  $|1-2x| + 1 = 4$

(e)  $\sqrt{2x-1} - \sqrt{x-5} = 3$

2. Solve each inequality. Express your answer using set notation or interval notation. Graph the solution set.

(a)  $\frac{2x-3}{5} + 2 \leq \frac{x}{2}$

(b)  $|3x+4| \geq \frac{5}{12}$

(c)  $1 - \left| \frac{2x-1}{3} \right| < -2$

3. Use the complex number system and write each expression in the standard form  $a + bi$

(a)  $4(3-i) + 3(-5+2i)$

(b)  $\frac{3}{3+i}$

(c)  $i^{153}$

4. Solve each equation in the complex number system, answers should be in the standard  $a + bi$  form

(a)  $x^2 + 3 = 0$

(b)  $2x^2 + 1 = 2x$

(c)  $2x^2 + 1 = 2x$

6. A flash of lightning is seen, and the resulting thunderclap is heard 3 seconds later. If the speed of sound averages 1100 feet per second, how far away is the storm?

5. Find the real solutions of each equation by factoring.  $x^3 + 4x^2 - x - 4 = 0$

7. An object is thrown down from the top of a building 1280 feet tall with an initial velocity of 32 feet per second. The distance  $s$  (in feet) of the object from the ground after  $t$  seconds is
8. Patrice, by himself, can paint four rooms in 10 hours. If he hires April to help, they can do the same job together in 6 hours. If he lets April work alone, how long will it take her to paint four rooms?

$$s = 1280 - 32t - 16t^2.$$

- (a) When will the object strike ground?
- (b) What is the height of the object after 4 seconds?

9. A 5-horsepower (hp) pump can empty a pool in 5 hours. A smaller, 2-hp pump empties the same pool in 8 hours. The pumps are used together to begin emptying this pool. After two hours, the 2-hp pump breaks down. How long will it take the larger pump to empty the pool?
10. The manager of a store that specializes in selling tea decides to experiment with a new blend. She will mix some Earl Grey tea that sells for \$5 per pound with some Orange Pekoe tea that sells for \$3 per pound to get 100 pounds of the new blend. The selling price of the new blend is to be \$4.50 per pound, and there is to be no difference in revenue from selling the new blend versus selling the other types. How many pounds of the Earl Grey tea and Orange Pekoe tea are required?