

1. True or False:

(a)  $(a + b)c = ac + bc$

(b) If  $ab = 1$ , then either  $a = 1$  or  $b = 1$  or both  $a$  and  $b$  equal 1

(c)  $\frac{a}{b} + \frac{c}{d} = \frac{a + c}{b + d}$

(d)  $\frac{a + c}{b} = \frac{a}{b} + \frac{c}{b}$

(e)  $5^{\frac{1}{2}} = \frac{1}{5^2}$

(f)  $(a + b)^2 = a^2 + b^2$

2. Rationalize the denominator in the following expressions:

(a)  $\frac{3x}{\sqrt[3]{x}}$

(b)  $\frac{2x + 3}{\sqrt{2x - 1}}$

3. Perform the indicated operations and simplify:

(a)  $3(2x^3 - x^2 + 5x) - 2x(3x^3 - 2x^2 + 5x - 3)$

(b)  $(2x^2 + 3x - 2)(x - 2)$

(c)  $(2x + 1)^3$

(d)  $(x^{\frac{1}{3}} + y^{\frac{1}{3}})(x^{\frac{2}{3}} - x^{\frac{1}{3}}y^{\frac{1}{3}} + y^{\frac{2}{3}})$

4. Factor each of the following expressions completely:

(a)  $2x^2 + x - 6$

(b)  $50x^2 + 45x - 18$

(c)  $9x^2 - 49y^6$

(d)  $8x^3 - y^3$

(e)  $6x^3y - 27x^2y - 15xy$

(f)  $3x^3 + x^2 - 3x - 1$

(g)  $x^6 - 1$

5. Simplify the following expressions:

(a)  $\frac{3x^2 - 10x + 3}{x^2 - 1} \cdot \frac{x^2 + x - 2}{x^2 - 9}$

(b)  $\frac{2x^2 + 4}{2x^2 + 7x - 4} - \frac{x - 1}{x + 4}$

(c)  $\frac{\frac{1}{x} + \frac{3}{x-2}}{\frac{4}{x-1} - \frac{2}{x-2}}$

(d)  $\frac{\frac{3}{2x+2h+1} - \frac{3}{2x+1}}{h}$

6. True or False:

(a) Every quadratic equation has two distinct real solutions.

(b)  $\sqrt{i^4} = -1$

(c)  $x = 0$  is a solution to the equation  $x(x - 2) = 4$

7. Use completing the square to solve the quadratic equation  $3x^2 - 12x + 5 = 0$ .

8. Solve the following quadratic equations:

(a)  $4x^2 - 5x + 10 = 2x^2 - 8x + 12$

(b)  $3x^2 + 10 = 5x$

9. Perform the indicated operations and express your answer in the form  $a + bi$ :

(a)  $(3 - 2i) - (12 + 6i)$

(b)  $(3 - 2i)(5 + 3i)$

(c)  $\frac{3 - 2i}{3i}$

(d)  $\frac{3 - 2i}{2 + 3i}$

(e)  $i^{3147}$

10. Solve the following equations:

(a)  $7x + 2 = -12$

(b)  $4(x - 1) + 3(2 - x) = 10$

(c)  $\frac{3}{10}x - \frac{3}{5} = \frac{3}{2}$

(d)  $-20x = 5x^2$

(e)  $(x + 6)(x - 2) = -7$

(f)  $\frac{3}{x + 6} - \frac{1}{x - 2} = \frac{-6}{x^2 + 4x - 12}$

(g)  $|2 - 3x| - 3 = 5$

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

(i)  $8x - x^{\frac{5}{3}} = 0$

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

(k)  $x + 5 = \sqrt{2x + 13}$

(l)  $\sqrt{x + 8} = 2 + \sqrt{x}$

(m)  $(y + 3)^{\frac{2}{3}} - 2(y + 3)^{\frac{1}{3}} - 3 = 0$

11. A movie theater charges adults \$7 per ticket while children pay \$4 per ticket. At one afternoon showing, 50 total tickets sold for \$218. How many adults bought tickets to the show?