1. Perform the indicated operations and simplify. Rationalize denominators where appropriate.
   a. \( \frac{5\sqrt{4}}{4\sqrt{2}} \)
   b. \( \sqrt{18} + \sqrt{2} \)
   c. \( \frac{10}{\sqrt{5}} \)
   d. \( 7\sqrt{x^3y} - x\sqrt{49xy} \)
   e. \( \frac{15}{9 - \sqrt{6}} \)
   f. \( \left( \frac{3\sqrt{-4y}}{2\sqrt{2y^2}} \right) \)

2. Use the square root property to find the exact answer to each of the following. 
   *Make sure to completely simplify your answers.*
   a. \( 3n^2 - 150 = 0 \)
   b. \( 70m^2 - 110 = 0 \)
   c. \( (2x - 3)^2 = 169 \)

3. Use completing the square to find the exact answer of the following. 
   *Make sure to completely simplify your answers.*
   a. \( 5p^2 + 30p + 20 = 0 \)
   b. \( (w - 1)(w + 4) = 7 \)

4. Use the quadratic formula to find the exact answer of the following. 
   *Make sure to completely simplify your answers.*
   a. \( 9a^2 + 12a = -4 \)
   b. \( (b - 1)(b + 1) = 15 \)

5. Simplify the following powers of \( i \).
   a. \( i^{63} \)
   b. \( i^{114} \)
   c. \( i^{2680} \)
6. Perform the indicated operations. Give your answers in \( a + bi \) form.
   a. \( 4(3 - 2i) - i(5 + 3i) \)
   b. \( (11 - 3i)(2 + 5i) \)
   c. \( \frac{5 - 2i}{4 + 3i} \)

7. Solve the following equations, your answers may be complex.
   a. \( x^2 + 25 = 0 \)
   b. \( x^2 = 4x - 6 \)

8. Solve the equation.
   a. \( \sqrt{16x - 64} = x \)
   b. \( \sqrt{2w + 1} = w + 1 \)
   c. \( \frac{\sqrt[3]{5y + 2}}{3} = -3 \)

9. Find the domain of each of the following functions. Give your answer in interval notation.
   a. \( f(x) = \sqrt[3]{3(x - 11)} \)
   b. \( g(x) = \sqrt{3 - 2x} \)
   c. \( h(x) = \frac{3}{\sqrt[3]{x} - 7} \)

10. Simplify the following using only positive exponents in your answers. Assume all variables represent positive real numbers.
    a. \( \left( \frac{1}{4^5} \right)^{\frac{2}{5}} \)
    b. \( \frac{y^{\frac{1}{4}}}{y^{\frac{1}{5}}} \)
    c. \( \frac{w^{\frac{3}{4}}}{w^{-\frac{3}{8}}} \)
    d. \( \left( 25v^{-\frac{3}{2}} \right)^{\frac{3}{2}} \)
    e. \( \left( \frac{27n^3}{n^{-\frac{2}{3}}} \right)^{-\frac{3}{2}} \)
    f. \( \frac{(5xy^2z^2)^{\frac{1}{3}} \left( 25x^2y^3z \right)^{\frac{1}{3}}}{3x^2y^{-\frac{1}{2}}z^{-2}} \)
ANSWERS

1. a. 4  b. $4\sqrt{2}$  c. $2\sqrt{5}$  d. 0  e. $\frac{9 + \sqrt{6}}{5}$  f. $-2v$

2. a. $n = \pm 5\sqrt{2}$  b. $m = \pm \frac{\sqrt{77}}{7}$  c. $x = -5$ or $x = 8$

3. a. $p = -3 + \sqrt{5}$ or $p = -3 - \sqrt{5}$  b. $w = \frac{-3 + \sqrt{53}}{2}$ or $w = \frac{-3 - \sqrt{53}}{2}$

4. a. $a = -\frac{2}{3}$  b. $b = -4$ or $b = 4$

5. a. $-i$  b. $-1$  c. 1

6. a. $15 - 13i$  b. $37 + 49i$  c. $\frac{14}{25} - \frac{23}{25}i$

7. a. $x = 5i$ or $x = -5i$  b. $x = 2 + i\sqrt{2}$ or $x = 2 - i\sqrt{2}$

8. a. $x = 8$  b. $w = 0$  c. $y = -\frac{29}{5}$

9. a. $[-11, \infty)$  b. $(-\infty, \frac{3}{2}]$  c. $(-\infty, \infty)$

10. a. $4^\frac{3}{2}$  b. $\frac{1}{y^{\frac{20}{7}}}$  c. $w^\frac{9}{8}$  d. $\frac{125}{v^\frac{2}{3}}$  e. $\frac{1}{9n^\frac{7}{2}}$  f. $\frac{5y^2z^3}{3x}$