9.6, 7.1-7.3 Review

*Complete work on separate paper

Solve each equation. Check each solution.

1. \( \frac{1}{x} = \frac{5}{9} \)  
   \( x = \pm 3 \)  

2. \( \frac{2x}{5} = \frac{x^2 - 5x}{5x} \)  
   \( x = -5 \)

3. \( \frac{3x}{4} = \frac{5x + 1}{3} \)  
   \( x = -\frac{4}{11} \)

4. \( \frac{-4}{x + 1} = \frac{5}{3x + 1} \)  
   \( x = -\frac{9}{17} \)

5. \( \frac{10}{x + 3} + \frac{10}{3} = 6 \)  
   \( x = \frac{3}{4} \)

6. \( x + \frac{4}{x} = \frac{25}{6} \)  
   \( x = \frac{3}{2}, \frac{8}{3} \)

7.1

Determine all real roots

1. \( 3\sqrt{216} \)  
   \( 6 \, \text{root} \)

2. \( 4\sqrt{16 - 81} \)  
   \( \frac{4}{3} \)

3. \( -\sqrt{343} \)  
   \( -7 \)

4. \( \sqrt{196} \)  
   \( 14 \)

5. \( -\sqrt{121} \)  
   \( -11 \)

6. \( \sqrt{(x+2)^4} \)  
   \( x+2 \)

7. \( \sqrt{121y^6} \)  
   \( 11y^3 \)

8. \( \sqrt[5]{243x^3y^{15}} \)  
   \( 5xy^3 \)

7.2

Simplify

1. \( \sqrt{4} \cdot \sqrt{16} \)  
   \( 2\sqrt{16} \)

2. \( 3\sqrt{2x} \cdot 5\sqrt{3xy} \)  
   \( 15\sqrt{6xy} \)

3. \( \sqrt{\frac{102a}{6a^3}} \)  
   \( \frac{\sqrt{27}}{3a} = \frac{3\sqrt{3}}{a} \)

4. \( \sqrt{2} \cdot \sqrt{8} \)  
   \( \text{No real solution} \)

5. \( \frac{\sqrt{xy}}{\sqrt{3x}} \)  
   \( \frac{\sqrt{3y}}{3} \)

6. \( \sqrt{3} \cdot \sqrt{27} = \sqrt{81} \)

7. \( \frac{\sqrt{\frac{x^2}{3y}}}{3\sqrt{9x^2y^2}} \)  
   \( \frac{\sqrt{\frac{x^2}{3y}}}{3\sqrt{9x^2y^2}} \)

8. \( \sqrt[3]{216x^4y^3} \)  
   \( 6xy \sqrt[3]{x} \)
7.3  
Simplify:

1. $9\sqrt{3} + 2\sqrt{3}$
   $= 11\sqrt{3}$

2. $5\sqrt{2} + 2\sqrt{3}$
   Cannot simplify.

3. $14\sqrt{xy} - 3\sqrt{xy}$
   $= 11\sqrt{xy}$

4. $3\sqrt{12} + 2\sqrt{50} - 5\sqrt{2}$
   $= 17\sqrt{2}$

5. $\frac{3-\sqrt{10}}{\sqrt{5} - \sqrt{2}}$
   $= \frac{\sqrt{5} - 2\sqrt{2}}{3}$

6. Multiply: $(3 + 5\sqrt{2})(4 - 2\sqrt{3})$
   $= 12 - 6\sqrt{3} + 20\sqrt{2} - 10\sqrt{6}$

7. Write the conjugate of $5 - \sqrt{2}x$
   $= 5 + \sqrt{2}x$

✔ Checkpoint Quiz 1

Use with Lessons 7-1 through 7-3.

Simplify each radical expression.

1. $\sqrt{-27x^8}$
   $= -3x^4$

2. $\sqrt{a^4b^6}$
   $= a^2b^3$

3. $\sqrt[4]{-32a^{15}b^{10}}$
   $= -2ab^3$\sqrt[4]{a}$

4. $\sqrt[4]{256y^8}$
   $= 4y^2$

Simplify each expression. Rationalize all denominators. Assume that all variables are positive.

5. $(2 - \sqrt{5})(2 + \sqrt{5})$
   $= 4 - 5 = -1$

6. $\frac{\sqrt{48a^9b}}{\sqrt{12ab}}$
   $= \frac{\sqrt{4a^4}}{1} = \frac{2a^2}{1}$

7. $\frac{7}{1 - \sqrt{3}}$
   $= \frac{7 + 7\sqrt{3}}{2}$

8. $2\sqrt[10]{15xy^3} \cdot 3\sqrt[10]{30x^3y^2}$
   $= \frac{6\sqrt{450x^4y^5}}{\sqrt{225x^2}}$
   $= \frac{15\sqrt{2}}{1}$

9. $15 \cdot \sqrt{2x^4y^5}$
   $= 90x^2y^2\sqrt{2y}$
1. \( \frac{1}{x} = \frac{x}{9} \)  \( x^2 = 9 \)  \( x = \pm 3 \)

2. \( \frac{2x}{5} = \frac{x^2 - 5x}{5x} \)  \( 10x^2 = 5x^2 - 25x \)
  \( -5x^2 + 25x = 0 \)  \( 5x(x + 5) = 0 \)
  \( 5x = 0 \)  \( x + 5 = 0 \)
  \( x = 0 \)  \( x = -5 \)

Check: \( \frac{0^2 - 5(0)}{5(0)} \to 0 \)  \( \text{cannot divide by zero!} \)
\( x = 0 \) is not a solution.
\( x = -5 \)

3. \( \frac{3x}{4} = \frac{5x + 1}{3} \)  \( 9x = 20x + 4 \)
  \( 0 = 11x + 4 \)
  \( -4 = 11x \)
  \( x = -\frac{4}{11} \)

4. \( \frac{4}{x+1} = \frac{5}{3x+1} \)  \( -12x - 4 = 5x + 5 \)
  \( -17x = 9 \)
  \( x = -\frac{9}{17} \)

5. \( \frac{10}{x+3} + \frac{10}{3} = \frac{6}{1} \)  \( \Rightarrow \frac{10}{x+3} = \frac{6}{1} - \frac{10}{3} \)
  \( \Rightarrow \frac{10}{x+3} = \frac{18 - 10}{3} \)
  \( \Rightarrow \frac{10}{x+3} = \frac{3}{3} \)
  \( \Rightarrow x + 3 = 3 \)
  \( \Rightarrow 30 = 8x + 24 \)
  \( 8x = 6 \)
  \( x = \frac{3}{4} \)

6. \( \frac{x + 4}{x} = \frac{25}{6} \)  \( \frac{x^2 + 4}{x} = \frac{25}{6} \)
  \( \Rightarrow x^2 + 4x = 25 \)
  \( \Rightarrow 6x^2 + 24 = 25x \)
  \( \Rightarrow 6x^2 - 25x + 24 = 0 \)

S: \( x^2 - 25x + 144 \)
F: \( (x - 9)(x - 16) \)
D: \( (x - 9/6)(x - 10/6) \)
R: \( (x - 3/2)(x - 8/3) \)
S: \( (2x - 3)(3x - 8) = 0 \)

1: \( \text{a: 144} \)
2: \( \text{a: 72} \)
3: \( \text{a: 48} \)
4: \( \text{a: 36} \)
5: \( \text{a: 24} \)
6: \( \text{a: 18} \)
7: \( \text{a: 10} \)
7.2 5. \( \frac{\sqrt{xy}}{\sqrt{3x}} = \frac{\sqrt{y}}{\sqrt{3}} = \frac{\sqrt{y}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3y}}{3} = \frac{\sqrt{3y}}{3} \)

7. 3\( \sqrt{\frac{x^2}{3y}} = \frac{3\sqrt{x^2}}{3\sqrt{3y}} = \frac{3\sqrt{y^2}}{3\sqrt{3y}} = \frac{3\sqrt{9x^2y^2}}{3\sqrt{27y^3}} = \frac{3\sqrt{9x^2y^2}}{3y} \)

7.3

4. \( 3\sqrt{82} + 2\sqrt{50} - 5\sqrt{2} \)

\( \sqrt{50} = \sqrt{25 \cdot 2} = 5\sqrt{2} \)
\( \sqrt{20} = \sqrt{4 \cdot 5} = 2\sqrt{5} \)

\( 3\sqrt{82} = 3 \cdot \sqrt{4 \cdot 20.5} = 3 \cdot 2\sqrt{5} \cdot \sqrt{2} = 6\sqrt{10} \)
\( 2\sqrt{50} = 2 \cdot \sqrt{25 \cdot 2} = 2 \cdot 5\sqrt{2} = 10\sqrt{2} \)

\( 3\sqrt{82} + 2\sqrt{50} - 5\sqrt{2} = 6\sqrt{10} + 10\sqrt{2} - 5\sqrt{2} = 17\sqrt{2} \)

5. \( \frac{(3-\sqrt{10}) (\sqrt{5} + \sqrt{2})}{(\sqrt{5} - \sqrt{2})(\sqrt{5} + \sqrt{2})} = \frac{3\sqrt{5} + 3\sqrt{2} - \sqrt{50} - \sqrt{20}}{\sqrt{25} - \sqrt{4}} = \frac{3\sqrt{5} + 3\sqrt{2} - 5\sqrt{2} - 2\sqrt{5}}{5 - 2} = \frac{\sqrt{2} - \sqrt{5}}{3} \)

Checkpoint Quiz

8. \( \left( \frac{7}{1 - \sqrt{3}} \right) \cdot \left( \frac{1 + \sqrt{3}}{1 + \sqrt{3}} \right) = \frac{7 + 7\sqrt{3}}{1 - \sqrt{9}} = \frac{7 + 7\sqrt{3}}{1 - 3} = \frac{7 + 7\sqrt{3}}{-2} = \frac{-7 - 7\sqrt{3}}{2} \)