Review:

Simplify and state the values which are not in the domain for each variable.

$$\frac{\frac{3}{x}-\frac{2}{x-2}}{\frac{2}{x}+\frac{5}{x-2}} = \frac{\frac{3}{x}\cdot\frac{x-2}{x-2} - \frac{2}{x-2}\cdot\frac{x}{x}}{\frac{2}{x}\cdot\frac{x-2}{x-2}+\frac{5}{x-2}\cdot\frac{x}{x}}$$

$$= \frac{\frac{3(x-2)}{x(x-2)}-\frac{2x}{x(x-2)}}{\frac{2(x-2)}{x(x-2)}+\frac{5x}{x(x-2)}} = \frac{\left(\frac{3x-6-2x}{x(x-2)}\right)}{\left(\frac{2x-4+5x}{x(x-2)}\right)}$$

$$= \frac{x-6}{\cancel{x(x-2)}}\cdot\frac{\cancel{x(x-2)}}{7x-4}$$

$$= \boxed{\frac{x-6}{7x-4},\ x\neq \frac{4}{7}, 0, 2}$$

Quiz #8

Subtract and simplify. State the values which are not in the domain for each variable.

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

$$=\frac{(x-2)(x+4)-(x^2-2)}{(x-3)(x+4)}$$

$$=\frac{x^2+4x-2x-8-x^2+2}{(x-3)(x+4)}$$

$$=\frac{2x-6}{(x-3)(x+4)}=\frac{2\cancel{(x-3)}}{\cancel{(x-3)}(x+4)}=\boxed{\frac{2}{x+4},\ x\neq -4, 3}$$

7.2 Operations on Radical Expressions

Properties of Radicals:

Let $m, n \in \mathbb{N}$ and $a, b \in \mathbb{R}$ $such$ $that$ $a^{\frac{1}{n}}, b^{\frac{1}{n}} \in \mathbb{R}$.

$\sqrt[n]{b} = b^{\frac{1}{n}}$

$\left(\sqrt[n]{b}\right)^m = \sqrt[n]{b^m} = b^{\frac{m}{n}}$

$\sqrt[n]{b^n} = \begin{cases} b, & if\ n\ is\ odd \\ |b|, & if\ n\ is\ even \end{cases}$

$\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$

$\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$

$\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a} = a^{\frac{1}{mn}} = \left(a^{\frac{1}{n}}\right)^{\frac{1}{m}} = \sqrt[m]{\sqrt[n]{a}}$

Add & Subtract Radicals by combining like terms

7.2

26. $3\sqrt[3]{11} - 8\sqrt[3]{11}$

$= \boxed{-5\sqrt[3]{11}}$

32. $\sqrt{48x} + \sqrt{147x}$

$$\begin{array}{r} 49 \\ 3\overline{)147} \\ -12 \\ \hline 27 \end{array}$$

$= \sqrt{2^2 \cdot 12 \cdot x} + \sqrt{3 \cdot 7^2 \cdot x}$

$= 2\sqrt{12x} + 7\sqrt{3x}$

$= 2\sqrt{2^2 \cdot 3x} + 7\sqrt{3x}$

$= 4\sqrt{3x} + 7\sqrt{3x}$

$= \boxed{11\sqrt{3x}}$

34. $\sqrt{18b} + \sqrt{75b}$

$\boxed{3\sqrt{2b} + 5\sqrt{3b}}$

46. $2b\sqrt[3]{16b^2} + \sqrt[3]{128b^5}$

$2^3 \cdot 2 \qquad 4^3 \cdot 2 \quad b^3 \cdot b^2$

$= 4b\sqrt[3]{2b^2} + 4b\sqrt[3]{2b^2}$

$= \boxed{8b\sqrt[3]{2b^2}}$

62. $\sqrt{a^3b}\,\sqrt{ab^4}$

$$=\sqrt{a^3bab^4}$$

$$=\sqrt[2]{a^4b^5}$$

$$\sqrt{(a^2)^2(b^2)^2\cdot b}=\boxed{a^2b^2\sqrt{b}}$$

64. $\sqrt{5x^3y}\,\sqrt{10x^3y^4}$

$$=\sqrt{50x^6y^5}$$

$$=\sqrt{50}\cdot\sqrt{x^6}\cdot\sqrt{y^5}$$

$25\cdot 2$

$5^2\cdot 2$

$$=5\sqrt{2}\,\sqrt{(x^3)^2}\,\sqrt{(y^2)^2\cdot y}$$

$$=\boxed{5|x^3|y^2\sqrt{2y}}$$

74. $\sqrt{3a}\left(\sqrt{27a^2}-\sqrt{a}\right)$; $a>0$

$$=\sqrt{3a}\sqrt{\underset{3\cdot3\cdot3}{27}a^2}-\sqrt{3a}\sqrt{a}$$

$$\sqrt{\underbrace{3\cdot3}_{3^2}\cdot\underbrace{3\cdot3}_{3^2}\cdot a\cdot a^2}-\sqrt{3\cdot\underbrace{a\cdot a}_{a^2}}$$

$$=\boxed{9a\sqrt{a}-a\sqrt{3}}$$

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

$$\sqrt{2}\sqrt{2}+4\sqrt{2}-3\sqrt{2}-3(4)$$

$$2+\sqrt{2}-12$$

$$\boxed{\sqrt{2}-10}$$

Rationalize the Denominator

(rewrite so there are no radicals in denominator)

100. $\frac{2}{\sqrt{3y}} \cdot \frac{\sqrt{3y}}{\sqrt{3y}} = \boxed{\frac{2\sqrt{3y}}{3y}}$

102. $\frac{9}{\sqrt{3a}} \cdot \frac{\sqrt{3a}}{\sqrt{3a}} = \frac{\overset{3}{\cancel{9}}\sqrt{3a}}{\cancel{3}a} = \boxed{\frac{3\sqrt{3a}}{a}}$

★. $\frac{5}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{5\sqrt{2}}{3 \cdot 2} = \boxed{\frac{5\sqrt{2}}{6}}$

114. $\frac{5}{(2-\sqrt{7})} \cdot \cancel{\frac{\sqrt{7}}{\sqrt{7}} = \frac{5\sqrt{7}}{2\sqrt{7}-7}}$

$$\frac{5}{2-\sqrt{7}} \cdot \frac{2+\sqrt{7}}{2+\sqrt{7}} = \frac{5(2+\sqrt{7})}{(2-\sqrt{7})(2+\sqrt{7})}$$

"conjugate" of $2-\sqrt{7}$

$$= \frac{10+5\sqrt{7}}{4+\cancel{2\sqrt{7}}-\cancel{2\sqrt{7}}-7}$$

$$= \boxed{\frac{10+5\sqrt{7}}{-3}}$$

120. $\frac{3-\sqrt{x}}{3+\sqrt{x}} \cdot \frac{3-\sqrt{x}}{3-\sqrt{x}} = \frac{9-3\sqrt{x}-3\sqrt{x}+x}{9-3\sqrt{x}+3\sqrt{x}-x}$

$$= \boxed{\frac{9-6\sqrt{x}+x}{9-x}}$$

122. $\frac{\sqrt{2}+\sqrt{3}}{\sqrt{3}-\sqrt{2}} \cdot \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}+\sqrt{2}}$

$$= \frac{\sqrt{6}+2+3+\sqrt{6}}{3+\sqrt{6}-\sqrt{6}-2}$$

$$= \frac{5+2\sqrt{6}}{1} = \boxed{5+2\sqrt{6}}$$

8.2 Solving Quadratic Equations using the Quadratic Formula

Given a quadratic equation in standard form,

$$ax^2 + bx + c = 0, \;\; a \neq 0$$

Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

8.2

60. $z^2 - 4z - 8 = 0$

$a = 1, \; b = -4, \; c = -8$

$$z = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-8)}}{2(1)}$$

$$= \frac{4 \pm \sqrt{16 + 32}}{2} = \frac{4 \pm \sqrt{48}}{2}$$

$$= \frac{4 \pm 2\sqrt{12}}{2} = \frac{\cancel{2}(2 \pm \sqrt{12})}{\cancel{2}} = \boxed{2 + \sqrt{12}, \; 2 - \sqrt{12}}$$

68. $4p^2 - 7p = -3$

$4p^2 - 7p + 3 = 0$

$a = 4, \; b = -7, \; c = 3$

$$p = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(4)(3)}}{2(4)}$$

$$= \frac{7 \pm \sqrt{49 - 48}}{8}$$

$$= \frac{7 \pm 1}{8} = \frac{7+1}{8}, \; \frac{7-1}{8}$$

$$= \boxed{1, \; \frac{3}{4}}$$

Homework:

7.2 #43-51odd; 57-65odd;85-91 odd; 97-103odd; 113-121odd

8.2 #59-69odd