Review:

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

$$\frac{2x-1}{x-4}-\frac{x^2-10x-7}{\underset{(x+5)(x-4)}{x^2+x-20}} = \frac{2x-1}{x-4}\cdot\frac{x+5}{x+5}-\frac{x^2-10x-7}{(x-4)(x+5)}$$

$$=\frac{(2x-1)(x+5)-(x^2-10x-7)}{(x-4)(x+5)}$$

$$=\frac{2x^2+10x-x-5-x^2+10x+7}{(x-4)(x+5)}$$

$$=\boxed{\frac{x^2+19x+2}{(x-4)(x+5)},\ x\neq 4,-5}$$

Quiz #8

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

$$\frac{\frac{3}{x}+\frac{4}{x+2}}{\frac{5}{x}-\frac{3}{x+2}} = \frac{\frac{3}{x}\cdot\frac{x+2}{x+2}+\frac{4}{x+2}\cdot\frac{x}{x}}{\frac{5}{x}\cdot\frac{x+2}{x+2}-\frac{3}{x+2}\cdot\frac{x}{x}}$$

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

$$=\frac{3x+6+4x}{\cancel{x(x+2)}}\cdot\frac{\cancel{x(x+2)}}{5x+10-3x}$$

$$=\frac{7x+6}{2x+10}=\boxed{\frac{7x+6}{2(x+5)},\ x\neq 0,-2,-5}$$

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

$48 = 4 \cdot 12$, $4 = 2^2$; $147 = 3 \cdot 49$, $49 = 7^2$

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

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

$12 = 4 \cdot 3$, $4 = 2^2$

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

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

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

$18 = 9 \cdot 2$; $75 = 25 \cdot 3$

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

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

$16 = 8 \cdot 2$, $8 = 2^3$; $128 = 64 \cdot 2$, $64 = 4^3$; $b^5 = b^3 \cdot b^2$

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

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

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

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

$=\sqrt{a^4b^5}$

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

$=\boxed{a^2b^2\sqrt{b}}$

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

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

$25\cdot 2 \quad (x^3)^2 \quad (y^2)^2y$

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

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

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

$\sqrt{\underbrace{\underbrace{3\cdot3}_{3^2}\cdot\underbrace{3\cdot3}_{3^2}}_{9^2}\cdot a\cdot a^2}-\sqrt{3a^2}$

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

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 demominator)

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

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

$\sqrt{3 \cdot 3 \cdot a \cdot a}$
$3^2 a^2$

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

114. $\frac{5}{2-\sqrt{7}}$ ~~$\cdot \frac{\sqrt{7}}{\sqrt{7}} = \frac{5\sqrt{7}}{2\sqrt{7}-7}$~~

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

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

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

$a+b$ & $a-b$

120. $\dfrac{3-\sqrt{x}}{3+\sqrt{x}} \cdot \dfrac{3-\sqrt{x}}{3-\sqrt{x}}$

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

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

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

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

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

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

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

$$z = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-8)}}{2(1)} = \frac{4 \pm \sqrt{16 + 32}}{2} = \frac{4 \pm \sqrt{48}}{2} = \frac{4 \pm 4\sqrt{3}}{2} = \frac{\cancel{2}(2 \pm 2\sqrt{3})}{\cancel{2}} = \boxed{2 \pm 2\sqrt{3}}$$

$2 + 2\sqrt{3}, \ 2 - 2\sqrt{3}$

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