

MTH 166 Review Homework

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1a. $2x - 4(5x + 1) = 3x + 17$

$2x - 20x - 4 = 3x + 17$

$-18x - 4 = 3x + 17$

$-21 = 21x \Rightarrow \boxed{x = -1}$

b. $\frac{4}{x+2} + \frac{2}{x-4} = \frac{30}{x^2 - 2x - 8}$ * $(x+2)(x-4)$
 $(x+2)(x-4)$

$4(x-4) + 2(x+2) = 30$

$4x - 16 + 2x + 4 = 30$

$6x - 12 = 30$

$6x = 42 \Rightarrow \boxed{x = 7}$

c. $3x^2 - 7x + 1 = 0$

$x = \frac{7 \pm \sqrt{49 - 12}}{2(3)} = \frac{7 \pm \sqrt{37}}{6}$

d. $(x-3)^2 - 24 = 0$

$\sqrt{(x-3)^2} = \sqrt{24} = 2\sqrt{6}$

$x-3 = \pm 2\sqrt{6} \Rightarrow x = 3 \pm 2\sqrt{6}$
 $+3 \quad +3$

e. $\sqrt{8-2x} - x = 0$

$(\sqrt{8-2x})^2 = (x)^2 \Rightarrow x^2 = 8-2x \Rightarrow$

$x^2 + 2x - 8 = 0$
 $(x+4)(x-2) = 0$

~~$x = -4$~~ , $\boxed{x = 2}$

$\sqrt{8+8} - (-4) = \sqrt{16} - (-4) = 4+4=8 \quad \times$

$\sqrt{8-4} - 2 = \sqrt{4} - 2 = 2-2=0 \quad \checkmark$

$$1f. 4|1 - \frac{3}{4}x| + 7 = 10$$

$$1 - \frac{3}{4}x = \frac{3}{4} \quad \text{or} \quad 1 - \frac{3}{4}x = -\frac{3}{4} \quad (2)$$

$$4|1 - \frac{3}{4}x| = 3$$

$$\left(-\frac{4}{3}\right) - \frac{3}{4}x = -\frac{4}{3} \left(-\frac{4}{3}\right) \quad \left(-\frac{4}{3}\right) - \frac{3}{4}x = -\frac{7}{4} \left(-\frac{4}{3}\right)$$

$$|1 - \frac{3}{4}x| = \frac{3}{4}$$

$$x = \frac{1}{3}$$

$$x = \frac{7}{3}$$

$$x = \left\{ \frac{1}{3}, \frac{7}{3} \right\}$$

$$2a. \frac{x}{3} - \frac{3}{4} - 1 > \frac{x}{2}$$

$$\left(\frac{x}{3} - \frac{7}{4} > \frac{x}{2} \right) | 12$$

$$4x - 21 > 6x$$

$$-21 > 2x$$

$$x < -\frac{21}{2}$$

$$(-\infty, -\frac{21}{2})$$

$$b. \left| \frac{2x+6}{3} \right| > 2$$

$$\frac{2x+6}{3} > 2 \quad \text{or} \quad \frac{2x+6}{3} < -2$$

$$2x+6 > 6$$

$$2x > 0$$

$$x > 0$$

$$2x+6 < -6$$

$$2x < -12$$

$$x < -6$$



$$(-\infty, -6) \cup (0, \infty)$$

$$c. -3 \leq \frac{2x+5}{3} < 6 \quad *3$$

$$\begin{array}{r} -9 \leq 2x+5 < 18 \\ -5 \quad -5 \quad -5 \end{array}$$

$$\frac{-14 \leq 2x < 13}{2}$$

$$-7 \leq x < \frac{13}{2}$$

$$[-7, \frac{13}{2})$$

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

$$\frac{2x}{x^2 + 3x + 2} = \frac{2x}{(x+1)(x+2)}$$

b.
$$\frac{2x\sqrt{x^2+5} - \frac{2x^3}{\sqrt{x^2+5}}}{x^2+5} \cdot \frac{\sqrt{x^2+5}}{\sqrt{x^2+5}} = \frac{2x(x^2+5) - 2x^3}{(x^2+5)^{3/2}} =$$

$$\frac{2x^3 + 10x - 2x^3}{(x^2+5)^{3/2}} = \frac{10x}{(x^2+5)^{3/2}}$$

4.
$$x(x+3)^{-3/5} + (x+3)^{2/5}$$

$$= (x+3)^{-3/5} [x + (x+3)] = (x+3)^{-3/5} (2x+3)$$