1.7, #18) $5(x-2)-3(x+3) \geq 2x-2$

$5(x-2)-3(x+3) \not\geq 2x-2$

$5x-10-3x-9 \not\geq 2x-2$

$2x-19 \not\geq 2x-2$

$-2x+19 \quad -2x+19$

$0 \not\geq 17$

$0 \geq 17$ False statement $\Rightarrow$ no solution

$-9 < 2x-1 \leq 9$

$+1 \quad +1 \quad +1$

$-8 < 2x \leq 10$

$\frac{-8}{2} < \frac{2x}{2} \leq \frac{10}{2}$

$-4 < x \leq 5$

$(-4, 5]$

$-9 < 2x-1$ AND $2x-1 \leq 9$

$+1 \quad +1 \qquad +1 \quad +1$

$-8 < 2x \qquad 2x \leq 10$

flip

$5 \geq x > -4$ switch $\rightarrow -4 < x \leq 5$

$2 < 5$ or $5 > 2$

1.6) $x^4 - 170x^2 + 169 = 0$

$a \cdot c = 1 \cdot 169 = 169$

$-169 \cdot -1 = 169$

$-169 + -1 = -170$

$x^4 - 170x^2 + 169 = 0$

$x^4 - 169x^2 - x^2 + 169 = 0$

$(x^4 - 169x^2) + (-x^2 + 169) = 0$

$x^4 - x^2 - 169x^2 + 169 = 0$

$(x^4 - x^2) + (-169x^2 + 169) = 0$

1.7) $\frac{-2x}{-2} \geq \frac{6}{-2}$

$x \leq -3$

flip

positive → $\frac{2x}{2} \geq \frac{-6}{2}$

$x \geq -3$

same

1.6, #22) $\frac{7|2x-1|}{7} = \frac{49}{7}$

$|2x-1| = 7$

$|?| = 7$

$|7| = 7$ and $|-7| = 7$

$2x - 1 = 7$ or $2x - 1 = -7$

$+1 \quad +1 \qquad +1 \quad +1$

$\frac{2x}{2} = \frac{8}{2} \qquad \frac{2x}{2} = \frac{-6}{2}$

$x = 4 \qquad x = -3$

$\frac{9|2x-1|}{9} = \frac{49}{9}$

$|2x-1| = \frac{49}{9}$

$2x - 1 = \frac{49}{9}$ or $2x - 1 = -\frac{49}{9}$

Quiz #1, #8) $\frac{8x}{x+1} = 2 - \frac{8}{x+1}$

↘ LCD = $x+1$

$x+1=0$

$-1 \quad -1$

$x=-1$

not allowed

$(x+1)\left(\frac{8x}{x+1}\right) = (x+1)\left(2 - \frac{8}{x+1}\right)$

$\frac{(x+1)}{1}\left(\frac{8x}{x+1}\right) = 2(x+1) - \frac{(x+1)}{1}\left(\frac{8}{x+1}\right)$

$8x = 2(x+1) - 8$

$8x = 2x+2-8$

$8x = 2x-6$

$-2x \quad -2x$

$\frac{6x}{6} = \frac{-6}{6}$

$x=-1$ Problematic

No solution

$$\frac{2}{x} + 3 = \frac{4}{3x} + \frac{28}{9}$$

$x=0$

not allowed

$\frac{3x}{3} = \frac{0}{3}$

$x=0$

repeated

~~$9 \neq 0$~~

$3x, x, 9$

LCD = $9x$

$3x \xrightarrow{\times 3} 9x$

$x \xrightarrow{\times 9} 9x$

$9 \xrightarrow{\times x} 9x$

$$x\left(\frac{2}{x}+3\right)=\left(\frac{4}{3x}+\frac{28}{9}\right)x$$

$$x\left(\frac{2}{x}\right)+x(3)=x\left(\frac{4}{3x}\right)+x\left(\frac{28}{9}\right)$$

$$2+3x=\frac{4}{3}+\frac{28x}{9}$$

$$9\left(2+3x\right)=9\left(\frac{4}{3}+\frac{28x}{9}\right)$$

$$9\cdot 2+9(3x)=\overset{3}{\cancel{9}}\left(\frac{4}{\cancel{3}}\right)+\cancel{9}\left(\frac{28x}{\cancel{9}}\right)$$

$$18+27x=12+28x$$

1.5, #5) $7x^2+14x=0$

$$7x(x+2)=0$$

same ↑ ↑ different

$7x^2 = 7 \cdot x \cdot x$

$14x = 2 \cdot 7 \cdot x$

$$7x(x+2)=0$$

$7x=0$ or $x+2=0$

$\frac{7x}{7}=\frac{0}{7}$ $\quad -2 \quad -2$

$x=0$ $\quad x=-2$

$\square \times \square = 0$

↑ ↑

0 or 0 or both

2 terms

1. GCF → have something in common
2. Difference of squares

↓

$(\ )^2-(\ )^2$

$4x^2-49$

1.5, #22) $\frac{1}{x} + \frac{1}{x+4} = \frac{1}{3}$

$x = 0$ — not allowed

$x + 4 = 0$

$-4 \quad -4$

$x = -4$ — not allowed

~~$3 = 0$~~

$$x\left(\frac{1}{x} + \frac{1}{x+4}\right) = \left(\frac{1}{3}\right)x$$

$$x\left(\frac{1}{x}\right) + x\left(\frac{1}{x+4}\right) = \left(\frac{1}{3}\right)x$$

$$1 + \frac{x}{x+4} = \frac{x}{3}$$

$$(x+4)\left(1 + \frac{x}{x+4}\right) = (x+4)\left(\frac{x}{3}\right)$$

$$(x+4)\cdot 1 + (x+4)\left(\frac{x}{x+4}\right) = (x+4)\left(\frac{x}{3}\right)$$

$$x + 4 + x = \frac{(x+4)\cdot x}{3}$$

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

$6x + 12 = x^2 + 4x$ ← quadratic ⇒ equal zero

$-6x \quad -12 \qquad -6x - 12$

$$0 = x^2 - 2x - 12$$

$a = 1$, $b = -2$, $c = -12$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-12)}}{2(1)}$$

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

Calculator: $-2^2 = -4$

$(-2)^2 = 4$

$$x\left(\frac{1}{x+4}\right)$$

Can't do this

$$x = \frac{2 \pm \sqrt{4+48}}{2} = \frac{2 \pm \sqrt{52}}{2}$$

$$x = \frac{2 \pm 2\sqrt{13}}{2} = \frac{2(1 \pm \sqrt{13})}{2}$$

$$x = 1 \pm \sqrt{13}$$

52
4 13

$\sqrt{4} \cdot \sqrt{13}$
2

$$\sqrt{3\sqrt{x+1}}^{2} = \sqrt{3x-4}^{2}$$

$$(a \cdot b)^2 = a^2 \cdot b^2$$

$$\left(3\sqrt{x+1}\right)^2 = (3x-4)^2$$

$$3^2 \sqrt{x+1}^{2} = (3x-4)(3x-4)$$

$$9(x+1) = 9x^2 - 12x - 12x + 16$$ → quadratic ⇒ equal zero

$$9x + 9 = 9x^2 - 24x + 16$$
$$-9x + 9 \qquad -9x - 9$$

$$0 = 9x^2 - 33x + 7$$

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

$a = 9$

$b = -33$

$c = 7$

Quiz #1, #9) 75% reduction

sale price = 140

original price = ? = x

sale price = original price − reduction amount

140 = x − .75x ← 75% of the original price

.75 multiply x

$140 = x - .75x$ $\quad 1 - .75$

$\frac{140}{.25} = \frac{.25x}{.25}$

$560 = x$

sale price = 184.04

includes 7% tax

original price = ? = x

$\underbrace{\text{Sale price}}_{184.04} = \underbrace{\text{original price}}_{x} + \underbrace{\text{amount of tax paid}}_{\text{7\% of the original price}}$

$.07x \quad x$

$184.04 = x + .07x$ $\quad 1 + .07$

$\frac{184.04}{1.07} = \frac{1.07x}{1.07}$

$172 = x$

$1x + .07x$

Quiz #1, #10) $C = \frac{1}{4}Fn$ for F

$4 \cdot C = \frac{4}{1} \cdot \frac{1}{4}Fn$

$\frac{4C}{n} = \frac{Fn}{n}$

$F = \frac{4C}{n}$

Quiz #1, #18) $-5 < 2x+1 \leq 9$

$-1 \quad -1 \quad -1$

$-6 < 2x \leq 8$

$\frac{-6}{2} < \frac{2x}{2} \leq \frac{8}{2}$

$-3 < x \leq 4$

$(-3, 4]$

$\left|\frac{2x-2}{4}\right| \geq 8$

$4 \cdot \frac{2x-2}{4} \geq 8 \cdot 4$ $\quad$ $4 \cdot \frac{2x-2}{4} \leq -8 \cdot 4$

$2x-2 \geq 32$ $\quad$ $2x-2 \leq -32$

$+2 \quad +2$ $\quad$ $+2 \quad +2$

$2x \geq 34$ $\quad$ $2x \leq -30$

$\frac{2x}{2} \geq \frac{34}{2}$ $\quad$ $\frac{2x}{2} \leq \frac{-30}{2}$

$x \geq 17$ $\quad$ $x \leq -15$

$(-\infty, -15] \cup [17, \infty)$

$|y| \leq \#$

$\downarrow$

$-\# \leq y \leq \#$

$|y| \geq \#$

$y \geq \#$ or $y \leq -\#$

$\frac{7|2x-3|}{7} = \frac{35}{7}$

$|2x-3| = 5$

$|?| = 5$

$|5| = 5$

$|-5| = 5$

$2x-3=5$ $+3\ +3$

$\frac{2x}{2}=\frac{8}{2}$

$x=4$

or

$2x-3=-5$ $+3\ +3$

$\frac{2x}{2}=\frac{-2}{2}$

$x=-1$

Exam Review #14

$$(x-3)^{2/3}=100$$

$$y^{\frac{a}{b}}=(\sqrt[b]{y})^a$$

$(x-3)^{\frac{2}{3}}=100$

$(\sqrt[3]{x-3})^2=100$

$\sqrt{(\sqrt[3]{x-3})^2}=\pm\sqrt{100}$

$(\sqrt[3]{x-3})^3=(\pm 10)^3$

$x-3=\pm 1000$ $+3\ +3$

$x=3\pm 1000$

$x=3+1000$

$x=1003$

$x=3-1000$

$x=-997$

$$25y^3-7=y-175y^2$$

(group) + (group) = 0

$25y^3 - 7 = y - 175y^2$

$-y + 175y^2 \quad -y + 175y^2$

$25y^3 + 175y^2 - y - 7 = 0$

$(25y^3 + 175y^2) + (-y - 7) = 0$

$25y^2(y + 7) - 1(y + 7) = 0$

same different

$25y^3 = 25 \cdot y \cdot y \cdot y$

$175y^2 = 25 \cdot 7 \cdot y \cdot y$

$25y^2(y+7) - 1(y+7) = 0$

$(y+7)(25y^2 - 1) = 0$

$(5y)^2 - (1)^2$

difference

$(y+7)(5y+1)(5y-1) = 0$

$y + 7 = 0$ $\quad 5y + 1 = 0$ $\quad 5y - 1 = 0$

$-7 \quad -7 \quad -1 \quad -1 \quad +1 \quad +1$

$y = -7 \quad \frac{5y}{5} = \frac{-1}{5} \quad \frac{5y}{5} = \frac{1}{5}$

$y = -\frac{1}{5} \quad y = \frac{1}{5}$

$\{ (25y^3 + 175y^2) - (y - 7) = 0$

belongs with y

$175 = 25 \cdot 7$

$$\sqrt{x+36} - \sqrt{x-20} = 4$$

$$\sqrt{x+36} = 4 + \sqrt{x-20}$$

$$\left(\sqrt{x+36}\right)^2 = \left(4 + \sqrt{x+20}\right)^2$$

$$x+36 = \left(4+\sqrt{x+20}\right)\left(4+\sqrt{x+20}\right)$$

$$x+36 = 16 + 4\sqrt{x+20} + 4\sqrt{x+20} + \left(\sqrt{x+20}\right)^2$$

$$x+36 = 16 + 8\sqrt{x+20} + x+20$$

$$x+36 = 36 + 8\sqrt{x+20} + x$$

$$-x \quad -36 \quad -36 \quad -x$$

$$\frac{0}{8} = \frac{8\sqrt{x+20}}{8}$$

$$0^2 = \left(\sqrt{x+20}\right)^2$$

$$0 = x+20$$

$$-20 \quad -20$$

$$-20 = x$$

$$(-4)^2 = (4)^2$$

$$16 = 16$$

$$\sqrt{x+36} - \sqrt{x-20} = 4$$

$$\sqrt{-20+36} - \sqrt{-20-20} = 4$$

$$\sqrt{16} - \sqrt{-40} = 4$$

$\sqrt{-40}$ → i → complex

No solution