

HW Solution Feb 12

P94 #8. a) $\frac{1}{x-6} - \frac{1}{x+6}$

$\Rightarrow CD = (x-6)(x+6), x \neq 6, x \neq -6$

$$= \frac{(x+6) - (x-6)}{(x-6)(x+6)} = \frac{x+6-x+6}{(x-6)(x+6)} = \frac{12}{(x-6)(x+6)}$$

8 b) $\frac{12}{x+8} + \frac{3}{x-9}$

* Restriction: $x \neq 6, x \neq -6$

$\Rightarrow CD = (x+8)(x-9), x \neq -8, x \neq 9$

$$= \frac{12(x-9) + 3(x+8)}{(x+8)(x-9)} = \frac{12x - 108 + 3x + 24}{(x+8)(x-9)}$$

$$= \frac{15x - 84}{(x+8)(x-9)}, x \neq -8, x \neq 9$$

8 c) $\frac{x+10}{x-6} - \frac{x-3}{x+4}$

$\Rightarrow CD = (x-6)(x+4), x \neq 6, x \neq -4$

$$= \frac{(x+10)(x+4) - (x-6)(x-3)}{(x-6)(x+4)}$$

$$= \frac{x^2 + 40 + 14x - (x^2 + 18 - 9x)}{(x-6)(x+4)}$$

$$= \frac{\cancel{x^2} + 40 + 14x - \cancel{x^2} - 18 + 9x}{(x-6)(x+4)}$$

8c)

$$= \frac{23x + 22}{(x-6)(x+4)}, \quad x \neq 6, \quad x \neq -4$$

$$d) \quad \frac{x+5}{x+1} + \frac{(x+2)}{x-2}$$

$$\Rightarrow \text{CD} = (x+1)(x-2), \quad x \neq -1, \quad x \neq 2$$

$$= \frac{(x-2)(x+5) + (x+1)(x+2)}{(x+1)(x-2)}$$

$$= \frac{x^2 - 10 + 3x + x^2 + 2 + 3x}{(x+1)(x-2)}$$

$$= \frac{2x^2 + 6x - 8}{(x+1)(x-2)} \rightarrow \text{HT} \quad \begin{array}{l} \text{ac} = 2x - 8 = -16 \\ b = 6 \end{array} \quad \begin{array}{l} \downarrow \\ 8x(-2) \end{array}$$

$$\begin{aligned} \Rightarrow 2x^2 + 8x - 2x - 8 &= 2x(x+4) - 2(x+4) \\ &= (2x-2)(x+4) \\ &= 2(x-1)(x+4) \end{aligned}$$

$$= \frac{2(x-1)(x+4)}{(x+1)(x-2)}, \quad x \neq -1, \quad x \neq 2$$

$$8d) \frac{x+5}{x+1} + \frac{x+2}{x-2}$$

$$\Rightarrow CD = (x+1)(x-2), \quad x \neq 2, \quad x \neq -1$$

$$= \frac{(x-2)(x+5) + (x+1)(x+2)}{(x+1)(x-2)}$$

$$= \frac{x^2 - 10 + 3x + x^2 + 2 + 3x}{(x+1)(x-2)}$$

HT $ac = 1 \times -4 = -4$
 $b = 3$
 \downarrow
 $4 \times (-1)$

$$= \frac{2x^2 + 6x - 8}{(x+1)(x-2)} = \frac{2(x^2 + 3x - 4)}{(x+1)(x-2)}$$

$$= \frac{2(x+4)(x-1)}{(x+1)(x-2)}, \quad x \neq 2, \quad x \neq -1$$

$$9a) \frac{x}{x^2 - 9x + 8} + \frac{2}{x-8}$$

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

$$* CD = (x-8)(x-1), \quad x \neq 8, \quad x \neq 1$$

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

9a) Continue

$$= \frac{3x-2}{(x-8)(x-1)}, \quad x \neq 8, \quad x \neq 1$$

$$9b) \frac{x+3}{(x+5)} + \frac{x+2}{x^2+3x-10}$$
$$= (x+5)(x-2)$$

$$* CD = (x+5)(x-2), \quad x \neq -5, \quad x \neq 2$$

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

$$= \frac{x^2 - 6 + x + x + 2}{(x+5)(x-2)} = \frac{x^2 + 2x - 4}{(x+5)(x-2)}, \quad x \neq -5, \quad x \neq 2$$

$$9c) \frac{x}{x^2+3x+2} - \frac{3x-2}{x^2+8x+7}$$

$$\swarrow (x+1)(x+2)$$

$$\downarrow (x+7)(x+1)$$

$$* CD = (x+1)(x+2)(x+7), \quad x \neq -1, -2, -7$$

$$= \frac{x(x+7) - (x+2)(3x-2)}{(x+1)(x+2)(x+7)}$$

$$= \frac{x^2 + 7x - (3x^2 - 4 + 6x - 2x)}{(x+1)(x+2)(x+7)}$$

9d) P94

$$= \frac{x+4}{(x^2-121)} - \frac{2x-1}{x^2+8x-33}$$

$$x^2-11^2 = (x+11)(x-11) \quad \hookrightarrow \text{HT: } (x+11)(x-3)$$

$$\Rightarrow \text{CD} = (x+11)(x-11)(x-3), \quad x \neq -11, 11, 3$$

$$= \frac{(x+4)(x-3) - (2x-1)(x-11)}{(x+11)(x-11)(x-3)}$$

$$= \frac{x^2-12+x - (2x^2+11-12x)}{(x+11)(x-11)(x-3)}$$

$$= \frac{-x^2+13x-23}{(x+11)(x-11)(x-3)}, \quad x \neq -11, 11, 3$$

11. a) $\frac{1}{x-2} - \frac{1}{2-x}$

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

$$= \frac{2}{x-2}, \quad x \neq 2$$

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$$11b) \frac{2x-7}{x-3} + \frac{x-9}{3-x}$$

$$= \frac{2x-7}{x-3} - \frac{(x-9)}{x-3} = \frac{2x-7-x+9}{x-3}$$

$$= \frac{x+2}{x-3}, \quad x \neq 3$$

$$11c) \frac{a+1}{5-2a} - \frac{a-4}{2a-5}$$

$$= \frac{a+1}{5-2a} - - \frac{a-4}{5-2a} = \frac{a+1+a-4}{5-2a}$$

$$= \frac{2a-3}{5-2a}, \quad a \neq \frac{5}{2}$$

$$11d) \frac{2b+3}{4b-1} + \frac{b+6}{1-4b}$$

$$= \frac{2b+3}{4b-1} + - \frac{b+6}{4b-1} = \frac{2b+3-b-6}{4b-1}$$

$$= \frac{b-3}{4b-1}, \quad b \neq \frac{1}{4}$$

p96 # 17 a) $A = \frac{x+4}{x^2+9x+20}$ $B = \frac{3x^2-9x}{x^2+3x-18}$

$$A = \frac{\cancel{(x+4)}}{(x+5)\cancel{(x+4)}} = \frac{1}{(x+5)}, \quad x \neq -5, x \neq -4$$

$\begin{matrix} \hookrightarrow \text{HT} \\ \downarrow \text{HT} \end{matrix}$

$$B = \frac{3x\cancel{(x-3)}}{(x+6)\cancel{(x-3)}} = \frac{3x}{x+6}, \quad x \neq -6, x \neq 3$$

b) No A and B are not equivalent.

c) $A = \frac{1}{(x+5)} \times \frac{x}{x} = \frac{x}{x(x+5)}$

$$B = \frac{3x}{x+6} \times \frac{y}{y} = \frac{3xy}{y(x+6)}$$

d) $A+B=?$ $AB=?$ $B \div A=?$

$$A+B = \frac{1}{(x+5)} + \frac{3x}{(x+6)} = \frac{x+6 + 3x(x+5)}{(x+5)(x+6)}$$

* CD = $(x+5)(x+6)$

$$= \frac{x+6 + 3x^2 + 15x}{(x+5)(x+6)} = \frac{3x^2 + 16x + 6}{(x+5)(x+6)}$$

$\left. \begin{matrix} x \neq -4 \\ x \neq -5 \\ x \neq -6 \\ x \neq 3 \end{matrix} \right\}$

$$d) AB = \frac{1}{(x+5)} \times \frac{3x}{(x+6)}$$

$$= \frac{3x}{(x+5)(x+6)}, \quad x \neq -5, x \neq -6$$

$$B \div A = \frac{3x}{(x+6)} \div \frac{1}{(x+5)}$$

$$= \frac{3x}{(x+6)} \times \frac{(x+5)}{1}, \quad x \neq -6, x \neq -5$$

$$= \frac{3x^2 + 15x}{(x+6)}, \quad x \neq -6, x \neq -5$$

19.

$$\frac{x+8}{2x^2+9x+10} \div \left(\frac{x^2+13x+40}{2x^2-x-15} \div \frac{x^2+10x+16}{x^2-9} \right)$$

HT: $ac=20 \rightarrow 5 \times 4$
 $b=9$

$$= \frac{x+8}{2x^2+5x+4x+10} \div \left(\frac{(x+8)(x+5)}{(2x^2-6x+5x-15)} \times \frac{(x+3)(x-3)}{(x+8)(x+2)} \right)$$

HT $(x+3)(x-3)$

$$= \frac{(x+8)}{(2x(x+2)+5(x+2))} \div \left(\frac{(x+8)(x+5)}{2x(x-3)+5(x-3)} \times \frac{(x+3)(x-3)}{(x+8)(x+2)} \right)$$

$$= \frac{(x+8)}{(x+2)(2x+5)} \div \left(\frac{\cancel{(x+8)}(x+5)}{(2x+5)\cancel{(x-3)}} \times \frac{\cancel{(x+3)}(x-3)}{\cancel{(x+8)}(x+2)} \right)$$

Restrictions

$$= \frac{(x+8)}{(x+2)(2x+5)} \div \frac{(x+5)(x+3)}{(2x+5)(x+2)}$$

$$= \frac{x+8}{(x+2)(2x+5)} = \frac{-x^2+9x+23}{(2x+5)(x+2)}, \quad \begin{cases} x \neq 3, -\frac{5}{2} \\ x \neq -8, -2 \end{cases}$$