

TBM 1A, 2. 10. 2015

Algebra I

$$\begin{aligned} \textcircled{1} \quad a) \quad & x - [y - (z - x) + \{-z + (-x)\}] \\ & = x - [y - z + x + \{-z - x\}] \\ & = x - [y - z + x - z - x] \\ & = x - [y - 2z] = \underline{\underline{x - y + 2z}} \end{aligned}$$

$$\begin{aligned} b) \quad & -[c - b - \{b - (-2 + 4c)\} + \{-2c - (3c - 2b) + 2\}] \\ & = -[c - b - \{b + 2 - 4c\} + \{-2c - 3c + 2b + 2\}] \\ & = -[c - b - \{b + 2 - 4c\} + \{-5c + 2b + 2\}] \\ & = -[c - b - b - 2 + 4c - 5c + 2b + 2] \\ & = -[0] = \underline{\underline{0}} \end{aligned}$$

$$\textcircled{2} \quad a) \quad -(-s)^2 = -(-s)(-s) = \underline{\underline{-s^2}}$$

$$b) \quad -(-x)^3 = -(-x)(-x)(-x) = \underline{\underline{x^3}}$$

$$c) \quad -a^2 \cdot (-a)^2 = -a^2 \cdot a^2 = \underline{\underline{-a^4}}$$

$$d) \quad -(-n)^{77} = -(-n^{77}) = \underline{\underline{n^{77}}}$$

$$\begin{aligned} \textcircled{3} \quad (xy^2 + 3z)^2 &= (xy^2)^2 + 2xy^2 \cdot 3z + (3z)^2 \\ &= \underline{\underline{x^2y^4 + 6xy^2z + 9z^2}} \end{aligned}$$

(4)

$$\begin{aligned} \text{a)} \quad & 3x^2 + 9tx + 6x \\ &= 3x(t^2 + 3t + 2) \\ &= \underline{3x(t+1)(t+2)} \end{aligned}$$

$$\begin{aligned} \text{b)} \quad & a^2 - 3a - 10 \\ &= \underline{(a+2)(a-5)} \end{aligned}$$

$$\begin{aligned} \text{c)} \quad & 3x^3y - 3x^2y - 60xy \\ &= 3xy(x^2 - x - 20) \\ &= \underline{3xy(x+4)(x-5)} \end{aligned}$$

$$\begin{aligned} \text{d)} \quad & 2x^2 + 6xy + 5x + 15y \\ &= 2x(x+3y) + 5(x+3y) \\ &= \underline{(2x+5)(x+3y)} \end{aligned}$$

$$\begin{aligned} \text{e)} \quad & \frac{1}{4}x^2 - \frac{1}{9}y^2 \\ &= \underline{\left(\frac{1}{2}x + \frac{1}{3}y\right)\left(\frac{1}{2}x - \frac{1}{3}y\right)} \end{aligned}$$

$$\begin{aligned} \text{f)} \quad & a^4 + 2a^2b^2 + b^4 \\ &= \underline{(a^2 + b^2)^2} \end{aligned}$$

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$$\begin{aligned} & \frac{\frac{5x^2 - 5}{x - 1}}{\frac{5x^2 + 10x + 5}{2x + 2}} = \frac{\frac{5(x^2 - 1)}{x - 1}}{\frac{5(x^2 + 2x + 1)}{2(x + 1)}} \\ & = \frac{\frac{5(x + 1)(x - 1)}{(x - 1)}}{\frac{5(x + 1)^2}{2(x + 1)}} = \frac{5(x + 1)}{\frac{5}{2}(x + 1)} \\ & = \frac{\frac{5}{1}}{\frac{5}{2}} = \underline{\underline{2}} \end{aligned}$$

6

$$(x + 12)(x - 3) = 54$$

$$x^2 + 12x - 3x - 36 = 54 \quad | -54$$

$$x^2 + 9x - 90 = 0$$

$$x^2 + 9x - 90 = 0$$

$$90 = 6 \cdot 15$$

$$(x - 6)(x + 15) = 0$$

$$\underline{\underline{x_1 = 6 \quad ; \quad x_2 = -15}}$$

$$\text{Test: } (6 + 12)(6 - 3) = 3 \cdot 18 = 54$$

$$(-15 + 12)(-15 - 3) = (-3)(-18) = 54$$

7

$$a) \frac{x^2 - y^2}{(y-x)^2} = \frac{(x+y)(x-y)}{(x-y)^2}$$

$$\begin{aligned} x-y &\neq y-x, \text{ aber: } (x-y)^2 = (y-x)^2 \\ &= \frac{(x+y)(x-y)}{(x-y)(x-y)} = \frac{x+y}{\underline{\underline{x-y}}} \end{aligned}$$

b) ~~1/1~~

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

$$\begin{aligned} x^4 + x^3 + x^2 + x &= x^3(x+1) + x(x+1) \\ &= (x^3 + x)(x+1) \\ &= x(x^2 + 1)(x+1) \end{aligned}$$

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