

Algebra

Term 1 Week 2

Date:

No.

1a. $3a^3 - 27a^2b + 3a^2c - 27abc$
 $= 3a^3 + 3a^2c - 27a^2b - 27abc$
 $= 3a^2(a+c) - 27ab(a+c)$
 $= (3a^2 - 27ab)(a+c)$
 $= 3a(a-9b)(a+c) \quad \#$

1b. $63 - 7w^2$
 $= 7(9 - w^2)$
 $= 7(3+w)(3-w) \quad \#$

2a. $\frac{3}{p} - \frac{p}{1+p} = \frac{5}{2}$
 $\frac{3+3p-p}{p(1+p)} = \frac{5}{2}$
 $2(3+2p) = 5p(1+p)$
 $6+4p = 5p+5p^2$
 $5p^2+p-6=0$
 $(5p+6)(p-1)=0$
 $5p+6=0 \quad \text{or} \quad p-1=0$
 $p=-\frac{6}{5} \quad \text{or} \quad p=1$
 $= -\frac{1}{5}$

2b. $\frac{4k-3k^2}{6k^2+k-12} = \frac{k(4-3k)}{(3k-4)(2k+3)}$
 $= \frac{-k}{2k+3}$
 $= -\frac{k}{2k+3} \quad \#$

2c. $1+mn = p-3qn$
 $mn+3qn = p-1$
 $n(m+3q) = p-1$
 $n = \frac{p-1}{m+3q} \quad \#$

3a. $\frac{1}{3}(x-4) + \frac{1}{4}(x-5) = \frac{1}{7}(x-9)$
 $\frac{1}{3}x - \frac{4}{3} + \frac{1}{4}x - \frac{5}{4} = \frac{1}{7}x - \frac{9}{7}$
 $\frac{1}{3}x + \frac{1}{4}x - \frac{1}{7}x = -\frac{9}{7} + \frac{4}{3} + \frac{5}{4}$
 $\frac{57}{84}x = \frac{125}{84}$
 $x = \frac{109}{84} \times \frac{84}{27}$
 $= \frac{109}{27}$
 $= 2\frac{35}{27} \quad \#$

3b. $(2x+1)(x+2)=5$
 $2x^2+4x+x+2=5$
 $2x^2+5x-3=0$
 $(2x-1)(x+3)=0$
 $2x-1=0 \quad \text{or} \quad x+3=0$
 $x=\frac{1}{2} \quad \text{or} \quad x=-3$

4a. $x = t - \frac{1}{t} \quad y = t + \frac{1}{t}$
 $xy = (t - \frac{1}{t})(t + \frac{1}{t})$
 $= t^2 - \frac{1}{t^2} \quad \#$

4b. $x^2 + y^2 = (t - \frac{1}{t})^2 + (t + \frac{1}{t})^2$
 $= t^2 - 2 + \frac{1}{t^2} + t^2 + 2 + \frac{1}{t^2}$
 $= 2t^2 + \frac{2}{t^2}$
 $= 2(t^2 + \frac{1}{t^2}) \quad \#$

4c. $x^2 - y^2 = (t - \frac{1}{t})^2 - (t + \frac{1}{t})^2$
 $= t^2 - 2 + \frac{1}{t^2} - t^2 - 2 - \frac{1}{t^2}$
 $= -4 \quad \#$

Given $x = \frac{3}{2}$
 $\frac{t^2-1}{t} = \frac{3}{2}$
 $2t^2-2=3t$
 $2t^2-3t-2=0$
 $(t-2)(2t+1)=0$
 $t=2 \quad \text{or} \quad t=-\frac{1}{2}$
 $\therefore y = 2\frac{1}{2} \quad \text{or} \quad y = -2\frac{1}{2} \quad \#$

$$5. \quad \frac{2}{V} + \frac{5}{V} = 13 \quad \text{--- (1)}$$

$$\frac{3}{V} - \frac{1}{4} = 10 \quad \text{--- (2)}$$

$$\frac{1}{4} = \frac{3}{V} - 10$$
$$= \frac{3-10V}{V}$$

$$4 = \frac{V}{3-10V} \quad \text{--- (3)}$$

Subst into (1)

$$2\left(\frac{3-10V}{V}\right) + \frac{5}{V} = 13$$

$$\frac{6-20V+5}{V} = 13$$

$$11-20V = 13V$$

$$11 = 33V$$

$$V = \frac{1}{3} \quad \#$$

$$4 = \frac{\frac{1}{3}}{3-10(\frac{1}{3})}$$

$$= \frac{\frac{1}{3}}{3 - \frac{10}{3}}$$

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

$$= -1$$

$$\therefore 4 = -1 \quad \#$$

$$V = \frac{1}{3} \quad \#$$