

Question 1:

(a)[5 points] Simplify and state your answer using only positive exponents:

$$\begin{aligned} & (x^2y^{-1}z)^3 (x^{-2}y^2z)^{-3} \\ &= x^6 y^{-3} z^3 x^6 y^{-6} z^{-3} \\ &= x^{12} y^{-9} \\ &= \frac{x^{12}}{y^9} \end{aligned}$$

(b)[5 points] Expand and simplify:

$$\begin{aligned} & \left(\frac{1}{5}\right) \left[ \frac{5}{3}(x-y) - \frac{5}{2}(y-x) \right] \\ &= \left(\frac{1}{5}\right) \left(\frac{5}{3}\right) (x-y) - \left(\frac{1}{5}\right) \left(\frac{5}{2}\right) (y-x) \\ &= \frac{1}{3}(x-y) - \frac{1}{2}(y-x) \\ &= \frac{1}{3}x - \frac{1}{3}y - \frac{1}{2}y + \frac{1}{2}x \\ &= x\left(\frac{1}{3} + \frac{1}{2}\right) - y\left(\frac{1}{3} + \frac{1}{2}\right) \\ &= x\left(\frac{2+3}{6}\right) - y\left(\frac{2+3}{6}\right) \\ &= \frac{5}{6}x - \frac{5}{6}y \quad \underline{\underline{=}} \quad \frac{5}{6}(x-y) \end{aligned}$$

Question 2:

(a)[5 points] Simplify

$$\begin{aligned} & \frac{2x^2 + 6x - 56}{2x - 8} \\ &= \frac{\cancel{2}(x^2 + 3x - 28)}{\cancel{2}(x - 4)} \\ &= \frac{\cancel{(x - 4)}(x + 7)}{\cancel{(x - 4)}} \\ &= x + 7 \end{aligned}$$

(b)[5 points] Simplify:

$$\begin{aligned} & \frac{(x^2 + a)^2 - a^2}{x^2} \\ &= \frac{[(x^2 + a) - a][(x^2 + a) + a]}{x^2} \\ &= \frac{[x^2 + \cancel{a} - a][x^2 + a + a]}{x^2} \\ &= \frac{\cancel{x^2}(x^2 + 2a)}{\cancel{x^2}} \\ &= x^2 + 2a \end{aligned}$$

Question 3:

(a)[5 points] Factor completely:

$$\begin{aligned}h^4 - 81 \\&= (h^2 + 9)(h^2 - 9) \\&= (h^2 + 9)(h - 3)(h + 3)\end{aligned}$$

(b)[5 points] Solve for  $w$ :

$$\begin{aligned}\frac{2w + 3}{5} &= \frac{1}{3} - \frac{3}{2}w \\30 \left( \frac{2w + 3}{5} \right) &= 30 \left( \frac{1}{3} - \frac{3}{2}w \right) \\6(2w + 3) &= 10 - 45w \\12w + 18 &= 10 - 45w \\57w &= -8 \\w &= \frac{-8}{57}\end{aligned}$$

Question 4:

(a)[5 points] Solve for  $x$ :

$$x = \frac{8 - x^2}{7}$$

$$7x = 8 - x^2$$

$$x^2 + 7x - 8 = 0$$

$$(x+8)(x-1) = 0$$

$$x+8=0, \quad x-1=0$$

$$x = -8, \quad x = 1$$

(b)[5 points] Solve for  $t$ :

$$2t^2 + 1 = 6t$$

$$2t^2 - 6t + 1 = 0$$

$$a = 2, \quad b = -6, \quad c = 1$$

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

$$= \frac{-(-6) \pm \sqrt{(-6)^2 - 4(2)(1)}}{2(2)}$$

$$= \frac{6 \pm \sqrt{36 - 8}}{4}$$

$$= \frac{6 \pm \sqrt{28}}{4}$$

$$= \frac{6 \pm 2\sqrt{7}}{4} = \frac{3 \pm \sqrt{7}}{2} = \frac{3 + \sqrt{7}}{2}, \frac{3 - \sqrt{7}}{2}$$

Question 5:

(a)[5 points] Solve for  $x$ . State your answer using interval notation.

$$-3 \leq \frac{x-3}{3} \leq 2$$

$$(3)(-3) \leq (3)\left(\frac{x-3}{3}\right) \leq (3)(2)$$

$$-9 \leq x-3 \leq 6$$

$$-6 \leq x \leq 9$$

$$[-6, 9]$$

(b)[5 points] Solve for  $x$ . Graph your solution:

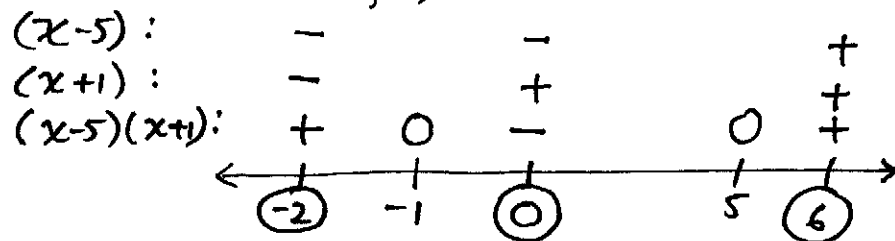
$$x^2 - 4x < 5$$

$$x^2 - 4x - 5 < 0$$

$$(x-5)(x+1) < 0$$

$$x-5=0, \quad x+1=0$$

$$x=5, \quad x=-1$$



$$\therefore (x-5)(x+1) < 0 \text{ on } (-1, 5) :$$

