

Exam 1

1 (a) $\left(\frac{5x^2}{y}\right)^{-1} \left(\frac{5x}{y^2}\right)^2 =$

$\rightarrow \frac{y}{5x^2} \cdot \frac{25x^2}{y^4} = \frac{25x^2 y}{5x^2 y^4} = \frac{5}{y^3}$

(b) $\frac{4}{3-\sqrt{7}} \cdot \frac{(3+\sqrt{7})}{(3+\sqrt{7})} = \frac{12+4\sqrt{7}}{9-7} = \frac{12+4\sqrt{7}}{2} = 6+2\sqrt{7}$

(c) $\frac{x^2}{x^2-4} \div \frac{x}{x-2} = \frac{x^2}{x^2-4} \cdot \frac{x-2}{x} =$

$\frac{x^2}{(\cancel{x-2})(x+2)} \cdot \frac{\cancel{x-2}}{x} = \frac{x}{x+2}, x \neq 0, 2$

2 (a) $13-4x = 5x-32 \Rightarrow 13+32-4x = 5x$
 $\Rightarrow 13+32 = 5x+4x \Rightarrow 45=9x \Rightarrow \boxed{x=5}$

(b) $|13-4x|=7$

$13-4x=7 \Rightarrow 6=4x \Rightarrow x=3/2$

$13-4x=-7 \Rightarrow 20=4x \Rightarrow x=5$

$\boxed{x=3/2, 5}$

(c) $0 = \frac{5}{x-3} - \frac{3}{2x+1} = \frac{5(2x+1)-3(x-3)}{(x-3)(2x+1)} =$

$\frac{10x+5-3x+9}{(x-3)(2x+1)} = \frac{7x+14}{(x-3)(2x+1)} \Rightarrow x = \frac{-14}{7} = \boxed{-2}$

$$(d) \quad x^2 - 6x - 11 = 0 \Rightarrow x^2 - 6x = 11 \Rightarrow$$

$$(x-3)^2 = x^2 - 6x + 9 = 11 + 9 = 20 \Rightarrow$$

$$x-3 = \pm \sqrt{20} \Rightarrow \boxed{x = 3 \pm \sqrt{20}}$$

$$(e) \quad \sqrt{2x-1} + 2 = x \Rightarrow \sqrt{2x-1} = x-2 \Rightarrow$$

$$2x-1 = (x-2)^2 = x^2 - 4x + 4 \Rightarrow$$

$$0 = x^2 - 6x + 5 = (x-5)(x-1) \Rightarrow$$

$$x = 1, 5, \text{ but } \underline{x \geq 1 \text{ fails,}}$$

$$\text{so } \boxed{x = 5}$$

$$(f) \quad 0 = x^4 - 25x^2 = x^2(x-5)(x+5) \Rightarrow$$

$$x = 0, \pm 5$$

$$[3] \quad (a) \quad 28 - 5x > 8 \Rightarrow 28 - 8 > 5x \Rightarrow$$

$$\frac{20}{5} > \frac{5x}{5} \Rightarrow 4 > x \Rightarrow (-\infty, 4)$$

$$(b) \quad x^2 + 3x \leq 10 \Rightarrow x^2 + 3x - 10 \leq 0$$

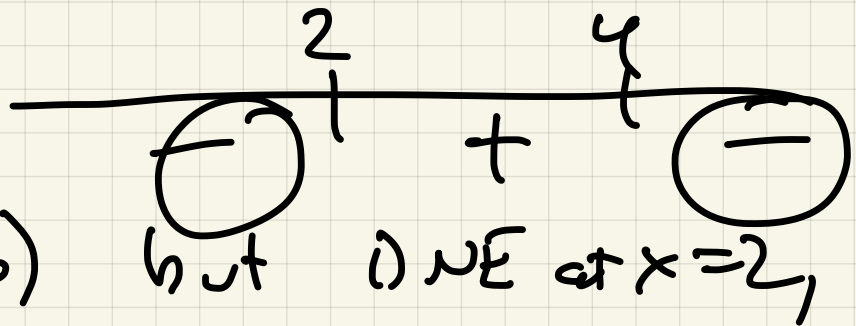
$$(x+5)(x-2) \leq 0 \quad x = -5, 2$$

$$\begin{array}{c} -5 \qquad \qquad 2 \\ + \quad | \quad - \quad | \quad + \end{array} \Rightarrow [-5, 2]$$

$$(c) \frac{6}{x-2} \leq 3 \Rightarrow \frac{6}{x-2} - 3 \leq 0 \Rightarrow$$

$$\frac{6 - 3(x-2)}{x-2} \leq 0 \Rightarrow \frac{6 - 3x + 6}{x-2} \leq 0 \Rightarrow$$

$$\frac{-3x + 12}{x-2} \leq 0$$



$$(-\infty, 2] \cup [4, \infty)$$

so $(-\infty, 2) \cup [4, \infty)$

$$[4] (a) p + q = (2x-5) + (x-4) = 3x-9$$

$$(b) p \cdot q = (2x-5)(x-4) = 2x^2 - (3x+20)$$

$$[5] (a) M = \left(\frac{-3+3}{2}, \frac{0+2}{2} \right) = \left(\frac{0}{2}, \frac{2}{2} \right) = (0, 1)$$



$$(c) \text{dist } A \text{ to } M = \sqrt{(-3-0)^2 + (0-1)^2} = \sqrt{10}$$

$$(d) x^2 + (y-1)^2 = 10$$

(e) Only has y-axis symmetry.

