

P95

$$[1.1] \quad x^2 - 4x > 0 \Rightarrow x(x-4) > 0 \Rightarrow x \in (-\infty, 4) \cup (4, \infty)$$

$$[1.2] \quad x^2 - 8x + 12 \leq 0 \Rightarrow (x-2)(x-6) \leq 0 \Rightarrow x \in [2, 6]$$

$$[1.3] \quad 2x^2 - 3x - 2 < 0 \Rightarrow (x-2)(x + \frac{1}{2}) < 0 \Rightarrow x \in (-\frac{1}{2}, 2)$$

$$[1.4] \quad 3x^2 - 7x + 10 \geq 2x^2$$

$$x^2 - 7x + 10 \geq 0$$

$$(x-2)(x-5) \geq 0$$

$$x \in (-\infty, 2] \cup [5, \infty)$$

$$[1.5] \quad (x+1)(x+4) > 18$$

$$x^2 + 5x + 4 > 18$$

$$x^2 + 5x - 14 > 0$$

$$(x+7)(x-2) > 0$$

$$x \in (-\infty, -7) \cup (2, \infty)$$

$$[1.6] \quad \frac{5x^2}{2} - \frac{x}{6} \geq \frac{1}{3}$$

$$15x^2 - x \geq 2$$

$$15x^2 - x - 2 \geq 0$$

$$x \in (-\infty, -\frac{1}{3}] \cup [\frac{2}{5}, \infty)$$

P97

$$[2.1] \quad x^2 - 4x - 1 > 0$$

$$x = \frac{4 \pm \sqrt{16+4}}{2} = 2 \pm \sqrt{5}$$

$$x \in (-\infty, 2 - \sqrt{5}) \cup (2 + \sqrt{5}, \infty)$$



P97, c+d

[2.2]

$$2x^2 - 6x + 3 < 0$$

$$x = \frac{3 \pm \sqrt{9-6}}{2} = \frac{3 \pm \sqrt{3}}{2}$$

$$x \in \left( \frac{3-\sqrt{3}}{2}, \frac{3+\sqrt{3}}{2} \right)$$

[2.3]

$$-5x^2 - 3x + 1 \leq 0$$

$$5x^2 + 3x - 1 \geq 0$$

$$x = \frac{-3 \pm \sqrt{9+20}}{10} = \frac{-3 \pm \sqrt{29}}{10}$$

$$x \in \left( -\infty, \frac{-3-\sqrt{29}}{10} \right) \cup \left( \frac{-3+\sqrt{29}}{10}, \infty \right)$$

[2.4]

$$2x^2 + 8x + 5 \leq 0$$

$$x = \frac{-4 \pm \sqrt{16-10}}{2} = \frac{-4 \pm \sqrt{6}}{2}$$

$$x \in \left[ \frac{-4-\sqrt{6}}{2}, \frac{-4+\sqrt{6}}{2} \right]$$

[3] Roots are  $-3, 2$ , so  $-p = -3 + 2 = -1$   
 $q = (-3)(2) = -6$

then

$$x^2 + px + q > 0 \equiv x^2 + x - 6 > 0$$

$$\therefore p = 1, q = -6$$

P98

$$[4.1] \quad x^2 + 4x + 4 > 0$$

$$(x+2)^2 > 0$$

$$\therefore x \in \mathbb{R} - \{-2\} \quad \text{or} \quad x \neq -2$$

$$[4.2] \quad 4x^2 - 4x + 1 < 0$$

$$x = \frac{2 \pm \sqrt{4-4}}{4} = \frac{1}{2}$$

$$\therefore x \in \emptyset$$

$$[4.3] \quad 9x^2 - 12x + 4 \geq 0$$

$$x = \frac{6 \pm \sqrt{36-36}}{9}$$

$$\therefore x \in \mathbb{R}$$

$$[4.4] \quad 64 \leq 16x - x^2$$

$$x^2 - 16x + 64 \leq 0$$

$$x = \frac{8 \pm \sqrt{64-64}}{1} = 8$$

$$\therefore x = 8$$

p99

$$[5.1] \quad x^2 - x + 1 > 0$$

$$x = \frac{1 \pm \sqrt{1-4}}{2}$$

$$\therefore x \in \mathbb{R}$$

$$[5.2] \quad x^2 + 2x + 5 < 0$$

$$x = \frac{-2 \pm \sqrt{4-5}}{2}$$

$$\therefore x \in \emptyset$$

$$[5.3] \quad 2x^2 - 4x + 3 \geq 0$$

$$x = \frac{2 \pm \sqrt{4-6}}{2}$$

, since  $D < 0$ , and  $a = 2$  is pos  
all soln lie above  $y = 0$ .

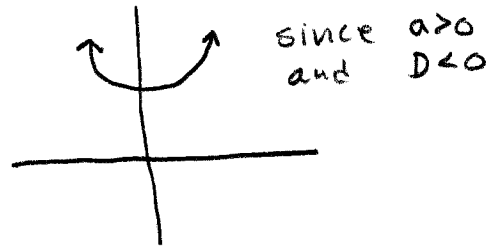
$$\therefore x \in \mathbb{R}$$

$$[5.4] \quad 5x \geq x^2 + 9$$

$$x^2 - 5x + 9 \leq 0$$

$$b^2 - 4ac = 25 - 36,$$

$$\therefore \emptyset$$



$$[6] \quad \begin{cases} x^2 - 6x + 5 \leq 0 \\ x^2 - 9x + 14 < 0 \end{cases}$$

$$x^2 - 6x + 5 \leq 0$$

$$(x-1)(x-5) \leq 0$$

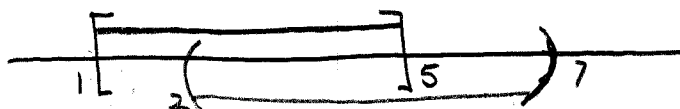
$$x \in [1, 5]$$

AND

$$x^2 - 9x + 14 < 0$$

$$(x-7)(x-2) < 0$$

$$x \in (2, 7)$$



$$\therefore x \in (2, 5]$$

$$[7] \quad \text{Find range } x \ni 2x + 5 < x^2 < 8 + 7x$$

$$2x + 5 < x^2$$

$$x^2 - 2x - 5 > 0$$

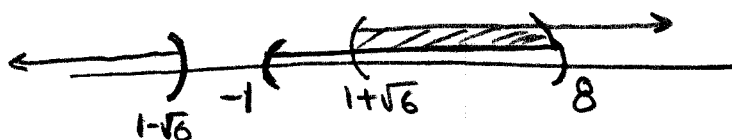
$$x \in (-\infty, 1 - \sqrt{6}) \cup (1 + \sqrt{6}, \infty)$$

AND

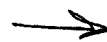
$$x^2 < 8 + 7x$$

$$x^2 - 7x - 8 < 0$$

$$x \in (-1, 8)$$



$$\therefore x \in (1 + \sqrt{6}, 8)$$



P101

[8] get  $x \in \mathbb{Z} \ni$

$$x^2 - 4x + 2 > 0$$

AND

$$x^2 + 2x - 15 < 0$$

$$x \in (-\infty, 2 - \sqrt{2}] \cup (2 + \sqrt{2}, \infty)$$

AND  $x \in \mathbb{Z}$ , so

$$x \in \{\dots, -3, -2, -1, 0, 1, 2, \dots\}$$

$$x \in (-5, 3) \text{ AND } x \in \mathbb{Z},$$

so

$$x \in \{-4, -3, -2, -1, 0, 1, 2\}$$

$$\therefore x \in \{-4, -3, -2, -1, 0, 1, 2\}$$

NOTE this is a  
Set of integers  
Not an interval  
of  $\mathbb{R}$ .

[9] Find  $p \in \mathbb{R}$  s.t

$$x^2 + \underbrace{2(2p+1)}_{\text{EVEN}}x - \underbrace{(p^2-1)}_{c = -(p^2-1)} = 0$$

has complex solns.

$$b' = 2p+1 \quad c = -(p^2-1)$$

$D < 0$  iff complex solns

$$(2p+1)^2 + (p^2-1) < 0$$

$$4p^2 + 4p + 1 + p^2 - 1 < 0$$

$$5p^2 + 4p < 0$$

$$p(5p+4) < 0$$

$$\text{So } p \in \left(-\frac{4}{5}, 0\right)$$