**Solutions to J10 page 102 exercises**

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[1.1] $x \in (-\infty, 3) \bigcup (4, \infty +)$

[1.2] $x \in \left(2 - \sqrt{11}, 2 + \sqrt{11}\right)$

[1.3] $x \in \left(-\infty, 4 - \sqrt{13}\right] \bigcup \left[4 + \sqrt{13}, \infty +\right)$

[1.4] $x = 6$

[1.5] $x \in \mathbb{R}$ or you can write $x \in (-\infty, \infty +)$

[1.6] $x \in \emptyset$

[1.7] $x \in (\frac{1}{2}, 3)$

[1.8] $x \in \emptyset$

[1.9] $x \in \left(-\infty, -4 - \sqrt{17}\right) \bigcup \left(-4 + \sqrt{17}, \infty +\right)$

[1.10] $x \in [-10, -3]$

**Completely worked solutions to the rest of th**

**questions on page 102 follow**

P102

[2] $P = 40 \text{ cm} = 2x + 2y$

$64 \text{ cm}^2 \le A = xy \le 91 \text{ cm}^2.$

Get width.

$$\begin{bmatrix} x + y = 20 \\ xy \le 91 \end{bmatrix} \Rightarrow \begin{bmatrix} y = 20 - x \\ xy \le 91 \end{bmatrix}$$

$$\Rightarrow \quad x(20 - x) \le 91$$
$$-x^2 + 20x - 91 \le 0$$
$$x^2 - 20x + 91 \ge 0$$

$\Rightarrow \ x \le 7$ or $x \ge 13$

But $x > 0$, else no rectangle. $x$ can be 7, since $40 - 14 = 26$ is a possible recangle $7 \times 13$ cm

$\boxed{\therefore \text{ so width must be no greater than 7 cm.}}$

[3] $M = \{x \ni 6x^2 - 7x - 5 > 0\}$ Get all integers in $M \cap N$

$N = \{x \ni x^2 - 2x - 8 < 0\}$

M

$6x^2 - 7x - 5 > 0$

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

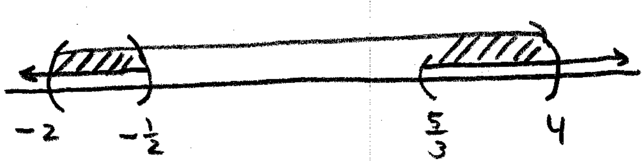
AND

N

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

$(x-4)(x+2) < 0$

$x \in (-2, 4)$




$\boxed{\therefore \ x = \{-1, 2, 3\}}$

p102, ctd

[4] $x^2 + 2(m-4)x + (3m-2) = 0$. Get $m \in \mathbb{R} \ni$ solns $\mathbb{R}$.

$D \geq 0$

$(m-4)^2 - (3m-2) \geq 0$

$m^2 - 8m + 16 - 3m + 2 \geq 0$

$m^2 - 11m + 18 \geq 0$

$(m-9)(m-2) \geq 0$

$\therefore \quad m \in (-\infty, 2) \cup (9, \infty+)$

[5] Solve $x^2 - (a+2)x + 2a < 0$ for $a > 2$

$$x = \frac{(a+2) \pm \sqrt{(a+2)^2 - 8a}}{2}$$

$$= \frac{a+2 \pm \sqrt{a^2 + 4a + 4 - 8a}}{2}$$

$$= \frac{a+2 \pm \sqrt{a^2 - 4a + 4}}{2}$$

$$= \frac{a+2 \pm (a-2)}{2}$$

$$= \frac{a+2+a-2}{2}, \quad \frac{a+2-a+2}{2}$$

$$= a, 2$$

$x \in (-\infty, 2) \cup (a, \infty+)$

$\boxed{\therefore \quad x \in (-\infty, 2) \cup (2, \infty+) \quad \text{or} \quad x \in \mathbb{R} - \{2\}}$

In other words when $a > 0$,
the soln of the inequality
is all real numbers except 2

P 102, ct6

[6] get p, q s.t. $2x^2 + px + q < 0$ has soln $x \in (\frac{1}{2}, 4)$

SOLN

$\frac{1}{2}$ and 4 must be the roots of $2x^2 + px + q = 0$.

So, $2x^2 + px + q = 2(x - \frac{1}{2})(x - 4)$

$= (2x - 1)(x - 4)$

$= 2x^2 - 9x + 4$

$\boxed{\therefore \quad p = -9 \text{ AND } q = 4}$