

## JASON'S QUESTIONS AND SOLUTIONS

**QUESTION 1:** Solve  $x^2 - 4 \leq 0$ .

**SOLUTION**

**STEPS**

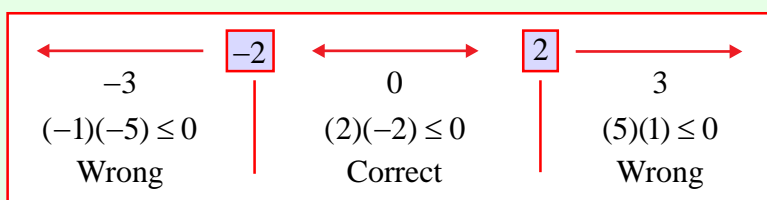
1. Get all terms on one side and zero on the other side.
2. Solve the corresponding equation to get the roots  $\alpha, \beta$ .
3. Carry out the region test. Use the roots in ascending order to form regions:  $\leftarrow \alpha \leftrightarrow \beta \rightarrow$  Choose a nice number in each region to test the inequality using the **test box**.
4. Based on the region test write down the solutions.

1.  $x^2 - 4 \leq 0$

2. Solve  $x^2 - 4 = 0 \Rightarrow (x+2)(x-2) = 0 \Rightarrow x = -2, 2$

Roots:  $\alpha = -2, \beta = 2$

3. Region Test on  $(x+2)(x-2) \leq 0$  ..... **Test Box**



4.  $\therefore -2 \leq x \leq 2$

**QUESTION 2:** If  $(x-a)^2$  is a factor of  $x^3 + 3px + q$  show that  $p = -a^2$ .

**SOLUTION**

You can prove this result by using the division process.

$$\begin{array}{r}
 x^2 - 2ax + a^2 \overline{) x^3 + 0x^2 + 3px + q} \\
 \underline{\mp x^3 \pm 2ax^2 \mp a^2x} \phantom{+ q} \\
 2ax^2 + (3p - a^2)x + q \\
 \underline{\mp 2ax^2 \pm 4a^2x \mp 2a^3} \\
 (3p + 3a^2)x + (q - 2a^3)
 \end{array}$$

As  $(x-a)^2$  is a factor, the remainder is zero, i.e.  $0x + 0$ .

$$\Rightarrow 3p + 3a^2 = 0 \Rightarrow p + a^2 = 0 \Rightarrow p = -a^2$$