

Maths 04 - Roots and Coefficient of roots

Review in Inequalities

- * If $a > b$ then $a+c > b+c$; $a-c > b-c$
- * If $a > b$ and $c > 0$ then $ac > bc$; $a/c > b/c$
- * If $a > b$ and $c < 0$ then $ac < bc$; $a/c < b/c$

Example: Find x for $4x-3 \geq 2-x$

$$4x-3+x \geq 2-x+x$$

$$5x-3+3 \geq 2+3$$

$$5x \geq 5 \quad \text{and} \quad \underline{\underline{x \geq 1}}$$

Sum and Product of Roots of QE

Let α, β be roots of QE $\Rightarrow (x-\alpha)(x-\beta)=0$

$$\Rightarrow x^2 - \alpha x - \beta x + \alpha\beta = 0$$

$$\Rightarrow x^2 - (\alpha+\beta)x + \alpha\beta = 0$$

$$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$$

Therefore: $ax^2 + bx + c = 0$

$$\text{sum of roots} = \alpha + \beta = -\frac{b}{a}$$

$$\text{product of roots} = \alpha\beta = \frac{c}{a}$$

Ex 1: $a=2, b=-8, c=1$; Find $\frac{1}{\alpha} + \frac{1}{\beta}$

$$\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta} = \frac{4}{\frac{1}{2}} = \underline{\underline{8}}$$

Ex 2: $a=3, b=-5, c=6$ Find $(\alpha-\beta)^2$

$$(\alpha-\beta)^2 = \alpha^2 - 2\alpha\beta + \beta^2$$

$$= \alpha^2 + 2\alpha\beta + \beta^2 - 4\alpha\beta$$

$$= (\alpha+\beta)^2 - 4\alpha\beta$$

$$= (5/3)^2 - 4(2) = -47/9 //$$

完
END