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2.5

1) a) $b^2 - 4ac > 0$

b) $b^2 - 4ac = 0$

c) $b^2 - 4ac < 0$

2) ai) $-2x^2 - 11x - 12$

$$(-11)^2 - 4(-2 \times -12)$$

$$= 25$$

aii) 2 distinct, real roots

b) $x^2 + 6x + 9$

$$(6)^2 - 4(1 \times 9)$$

$$= 0$$

bii) 1 repeated root

c) $3x^2 - 12x + 18$

$$(-12)^2 - 4(3 \times 18)$$

$$= -72$$

cii) NO real roots

3) a) $x^2 - 10x + 21$

$$(-10)^2 - 4(1 \times 21)$$

$$= 16$$

\therefore 2 distinct roots so matches with graph ii)

b) $-x^2 - 10x - 25$

$$(-10)^2 - 4(-1 \times -25)$$

$$= 0$$

\therefore 1 real root so matches with graph iii)

c) $x^2 + 8x + 19$

$$(8)^2 - 4(1 \times 19)$$

$$= -12$$

\therefore NO real roots so matches with graph i)

4) a) $x^2 + Kx + 25$

$$(K)^2 - 4(1 \times 25)$$

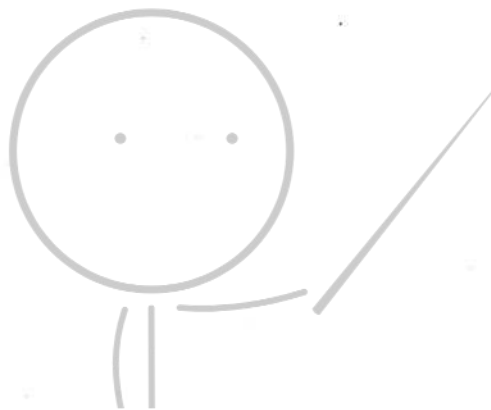
$$= K^2 - 100$$

b) $K^2 - 100 = 0$

$$K^2 = 100$$

$$K = \sqrt{100}$$

$$K = \pm 10$$



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$$5) a) f(x) = x^2 + (k+3)x + k$$

$$\begin{aligned} & (k+3)^2 - 4(1 \times k) \\ & = k^2 + 6k + 9 - 4k \\ & = \underline{k^2 + 2k + 9} \end{aligned}$$

$$b) k^2 + 2k + 9$$

$$(k+1)^2 - 1 + 9 = \underline{(k+1)^2 + 8}$$

c) $(k+1)^2 + 8$ is always positive so it shows that there are 2 distinct real roots

$$6) kx^2 + 3x - 5 = 0$$

$$\begin{aligned} & (3)^2 - 4(k \times -5) \\ & = 9 + 20k \end{aligned}$$

$$9 + 20k > 0$$

$$20k > -9$$

$$\underline{k > -9/20}$$

$$7) 2x^2 + 7x + p$$

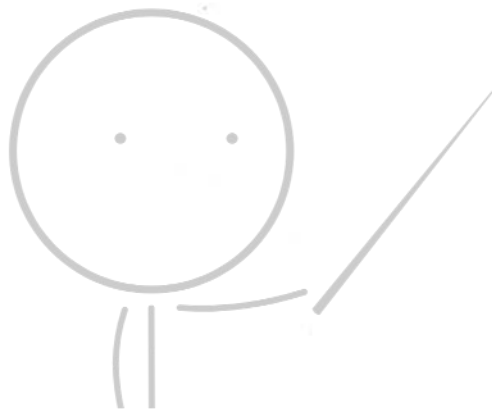
$$(7)^2 - 4(2 \times p)$$

$$= 49 - 8p$$

$$49 - 8p < 0$$

$$49 < 8p$$

$$\underline{p > 49/8}$$



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