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2.5

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

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

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

2) ai) $\overset{a}{-2}x^2 \overset{b}{-11}x \overset{c}{-12}$

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

$= \underline{25}$

aii) 2 distinct, real roots

bi) $\overset{a}{x}^2 + \overset{b}{6}x + \overset{c}{9}$

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

$= \underline{0}$

bii) 1 repeated root

ci) $\overset{a}{3}x^2 \overset{b}{-12}x + \overset{c}{18}$

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

$= \underline{-72}$

cii) NO real roots

3) a) $\overset{a}{x}^2 \overset{b}{-10}x + \overset{c}{21}$

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

$= \underline{16}$

∴ 2 distinct roots so matches with graph ii)

b) $\overset{a}{-x}^2 \overset{b}{-10}x \overset{c}{-25}$

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

$= \underline{0}$

∴ 1 real root so matches with graph iii)

c) $\overset{a}{x}^2 + \overset{b}{8}x + \overset{c}{19}$

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

$= \underline{-12}$

∴ NO real roots so matches with graph i)

4) a) $\overset{a}{x}^2 + \overset{b}{k}x + \overset{c}{25}$

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

$= \underline{k^2 - 100}$

b) $k^2 - 100 = 0$

$k^2 = 100$

$k = \sqrt{100}$

$\underline{k = \pm 10}$

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

$(k+3)^2 - 4(1 \times k)$

$= k^2 + 6k + 9 - 4k$

$= \underline{k^2 + 2k + 9}$

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

$(3)^2 - 4(k \times -5)$

$= 9 + 20k$

$9 + 20k > 0$

$20k > -9$

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

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

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

$= 49 - 8p$

$49 - 8p < 0$

$49 < 8p$

$\underline{p > 49/8}$