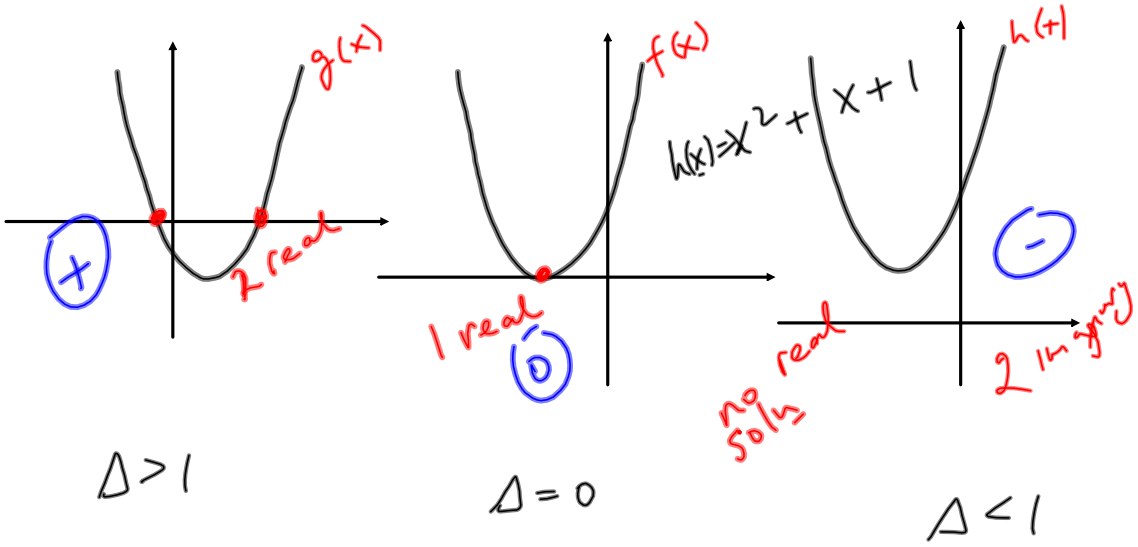
$\Delta = b^2 - 4ac$ Δ = Discriminant



$\Delta > 1$ $\Delta = 0$ $\Delta < 1$

Example 2

Find the values of k so that $-8 + kx - 2x^2 = 0$ has equal roots.

$\Delta = 0$

$b^2 - 4ac = 0$

$a = -2$
$b = k$
$c = -8$

$-2x^2 + kx - 8 = 0$

$k^2 - 4(-2)(-8) = 0$

$k^2 - 64 = 0$

$k^2 = 64$

$k = \pm 8$

$(k-8)(k+8) = 0$

$k = 8$ or $k = -8$

5. For what value(s) of k does each of the following equations have equal roots?

(i) $x^2 - 10x + k = 0$ (ii) $4x^2 + kx + 9 = 0$ (iii) $x^2 - x(2k + 2) + 5k + 1 = 0$

(ii) $\Delta = 0$

$b^2 - 4ac = 0$

$a = 4$

$b = k$

$c = 9$

$\Rightarrow K^2 - 4(4)(9) = 0$

$K^2 - 144 = 0$

$K^2 = 144$

$K = \pm 12$

7. Given that (any real number)$^2 \geq 0$, prove that the following equations have real roots for all values of $k \in \mathbb{R}$

(i) $x^2 - 3kx - k^2 = 0$ (ii) $kx^2 + 2x + (2 - k) = 0$

$\Delta \geq 0$

$b^2 - 4ac \geq 0$

$a = 1$

$b = -3k$

$c = -k^2$

$\Rightarrow (-3k)^2 - 4(1)(-k^2) \geq 0$

$9k^2 + 4k^2 \geq 0$

$13k^2 \geq 0$ $(\div 13)$

$k^2 \geq 0$

this is true for every value of $k \in \mathbb{R}$!