

# Day one : Solutions

(1)

#1. a. Discriminant  $\Rightarrow \Delta = b^2 - 4ac = 0$

$$y = x^2 + kx + (k+3) \Rightarrow (k)^2 - (4)(1)(k+3) = 0$$

$$k^2 - 4k - 12 = 0$$

$$(k-6)(k+2) = 0$$

$$\boxed{k=6, k=-2}$$

b. Discriminant  $\Rightarrow \Delta = b^2 - 4ac > 0$

$$\Rightarrow (k^2 - 4k - 12) > 0$$

$$(k-6)(k+2) > 0$$

$$\boxed{(-\infty, -2) \cup (6, \infty)}$$

Sign diagram.

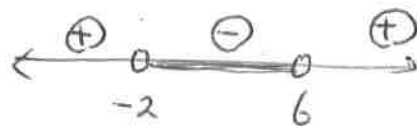


c. Discriminant  $\Rightarrow \Delta = b^2 - 4ac < 0$

$$\Rightarrow k^2 - 4k - 12 < 0$$

$$(k-6)(k+2) < 0$$

$$\boxed{-2 < k < 6}$$



#2. a  $f(2) = (3)(2) + 5 = 11$

$$g \circ f(2) = g(11) = \sqrt{11-2} + 8 = 3 + 8 = \boxed{11}$$

b.  $g^{-1}(10) \Rightarrow 10 = \sqrt{x-2} + 8$

$$\Rightarrow 2 = \sqrt{x-2}$$

$$\Rightarrow 4 = x-2 \Rightarrow \boxed{x=6}$$