

3

$$f(x) = x^2 + (k+3)x + k.$$

(2)

a) Discriminant:

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

$$\begin{aligned}b) & (k+1)^2 - 1 + 9 \\ & (k+1)^2 + 8.\end{aligned}$$

c)  $f(x) = 0$  has real roots iff  
 $\Delta > 0$  ie  $(k+1)^2 + 8 > 0$ .

$$(k+1)^2 > 0 \quad (k+1)^2 + 8 > 0.$$

$\therefore f(x)$  has real roots.