

Quadratics – Q5 [Practice/E] (16/6/21)

Find k if $y = kx + 1$ touches $y = x^2 + 2x + 3$

Solution

Any points of intersection occur where $kx + 1 = x^2 + 2x + 3$;

$$\text{ie } x^2 + (2 - k)x + 2 = 0$$

In order for the line to touch the curve, the discriminant must be zero;

$$\text{ie } \Delta = (2 - k)^2 - 4(2) = 0,$$

$$\text{so that } k^2 - 4k - 4 = 0$$

$$\text{Thus } k = \frac{4 \pm \sqrt{16 - (-16)}}{2} = 2 \pm 2\sqrt{2}$$