

4 A circle  $C$  has equation  $x^2 + y^2 - 6x + 10y + k = 0$ .

(a) Find the set of possible values of  $k$ . [2]

(b) It is given that  $k = -46$ .

Determine the coordinates of the **two** points on  $C$  at which the gradient of the tangent is  $\frac{1}{2}$ . [5]