1. The curve *C* has equation

$x^2 + xy + y^2 - 4x - 5y + 1 = 0$

(*a*) Use implicit differentiation to find $\frac{\mathrm{d}y}{\mathrm{d}x}$ in terms of *x* and *y*. **(5)**

(*b*) Find the *x* coordinates of the two points on *C* where $\frac{\mathrm{d}y}{\mathrm{d}x} = 0$

Give exact answers in their simplest form.

(*Solutions based entirely on graphical or numerical methods are not acceptable.*) **(5)**

2. The curve *C* has equation $x^2 - 3xy - 4y^2 + 64 = 0$.

(*a*) Find $\frac{\mathrm{d}y}{\mathrm{d}x}$ in terms of *x* and *y*.

(5)

(*b*) Find the coordinates of the points on *C* where $\frac{\mathrm{d}y}{\mathrm{d}x} = 0$.

(*Solutions based entirely on graphical or numerical methods are not acceptable.*) **(6)**

3. $x^2 + y^2 + 10x + 2y - 4xy = 10$

(a) Find $\frac{dy}{dx}$ in terms of x and y, fully simplifying your answer. **(5)**

(b) Find the values of y for which $\frac{dy}{dx} = 0$ **(5)**