3. The curve C has equation

$$x^2 + y^2 + fxy = g^2,$$

where f and g are constants and $g \neq 0$.

(a) Find an expression in terms of α, β and f for the gradient of C at the point (α, β).

(4)

Given that $f < 2$ and $f \neq -2$ and that the gradient of C at the point (α, β) is 1,

(b) show that $\alpha = -\beta = \dfrac{\pm g}{\sqrt{(2-f)}}$.

(4)

Given that $f = -2$,

(c) sketch C.

(3)