1. A curve C is described by the equation

$$3x^2 + 4y^2 - 2x + 6xy - 5 = 0.$$

Find an equation of the tangent to C at the point $(1, -2)$, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(7)

$$6x + 8y\frac{dy}{dx} - 2 + 6x\frac{dy}{dx} + 6y = 0$$

$$(8y + 6x)\frac{dy}{dx} = 2 - 6x - 6y$$

$$(4y + 3x)\frac{dy}{dx} = 1 - 3x - 3y$$

$$\frac{dy}{dx} = \frac{1 - 3x - 3y}{4y + 3x}$$

Gradient at $(1, -2)$

$$= \frac{1 - 3(1) - 3(-2)}{4(-2) + 3(1)}$$

$$= \frac{1 - 3 + 6}{-8 + 3}$$

$$= \frac{4}{-5} = -\frac{4}{5}$$

$$y - y_1 = m(x - x_1)$$

$$y - -2 = -\frac{4}{5}(x - 1)$$

$$y + 2 = -\frac{4}{5}(x - 1)$$

$$5y + 10 = -4x + 4$$

$$4x + 5y + 6 = 0$$