14. The curve C has equation

$$y = \frac{e^{2x}}{x^3 + 4} \qquad x > -1$$

(a) Find $\frac{dy}{dx}$

(3)

The point P with x coordinate p lies on C.
The line l is the tangent to C at P.

Given that l passes through the origin,
(b) show that $x = p$ is a solution of the equation

$$x^4 - 2x^3 + 4x - 2 = 0$$

(3)

The iteration formula

$$x_{n+1} = \frac{2x_n^{\,3} + 2}{x_n^{\,3} + 4}$$

with $x_1 = 0.5$ is used to find an approximation for p.

(c) Use the iteration formula to find the value, to 4 decimal places, of

(i) x_2

(ii) p

(3)

(d) Hence find the gradient of l, giving your answer to 2 decimal places.

(1)