3. A curve has equation

$$y = x^2 + kx + 14 - \frac{8}{(x - 5)}$$

where k is a constant.

Given that the curve has a stationary point P, where $x = 3$

(a) show that $k = -8$

(4)

(b) Determine the nature of the stationary point P, giving a reason for your answer.

(2)

(c) Show that the curve has a point of inflection where $x = 7$

(2)

The curve passes through the points $(4.5, 14.25)$ and $(5.5, -15.75)$

Jane uses this information to write down the following

> As there is a change of sign, the curve cuts the x-axis in the interval $(4.5, 5.5)$

(d) Explain the error in Jane's reasoning.

(1)