10.

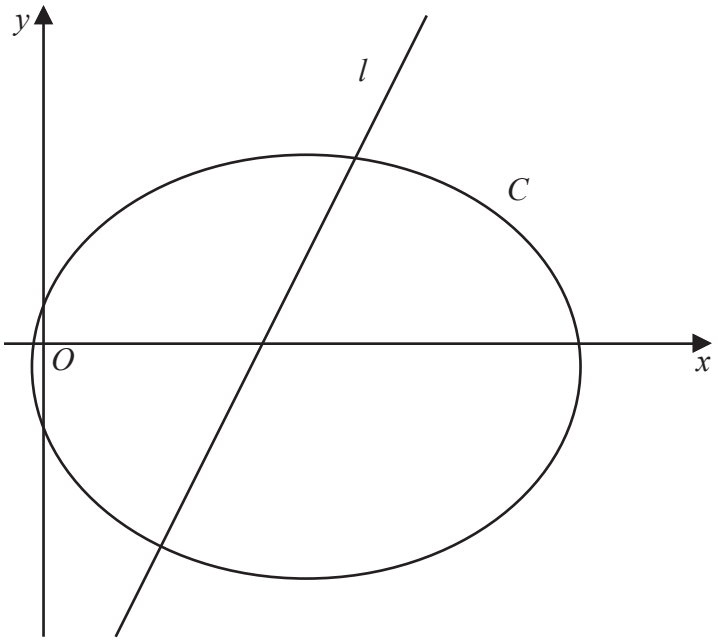


Figure 6

In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.

Figure 6 shows a sketch of

- the curve C with equation $x^2 + 2y^2 - 6x + y - 1 = 0$
- the line l with equation $y = 2x + k$ where k is a constant

Given that k can vary,

(a) show that when l touches C

$$2k^2 + 25k - 13 = 0$$

(4)

Given further that

- $k < 0$
- l touches C at the point P

(b) find the exact coordinates of P

(5)

(Total for Question 10 is 9 marks)

TOTAL FOR PAPER IS 75 MARKS