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Tangents to a curve | Past Papers Question | P1 CIE June 2013 Q7(ii)

A curve has equation $y = x^2 - 4x + 4$ and a line has equation $y = mx$, where m is a constant.

- (ii) Find the non-zero value of m for which the line is a tangent to the curve, and find the coordinates of the point where the tangent touches the curve. [5]

$$y = x^2 - 4x + 4 \quad \textcircled{1}$$

$$y = mx \quad \textcircled{2}$$

Sub. ② into ①

$$\therefore mx = x^2 - 4x + 4$$

$$\therefore x^2 - (4+m)x + 4 = 0$$

for 1 root ' $b^2 - 4ac = 0$ '

$$\therefore [-(4+m)]^2 - 4(1)(4) = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\therefore (4+m)^2 = 16$$

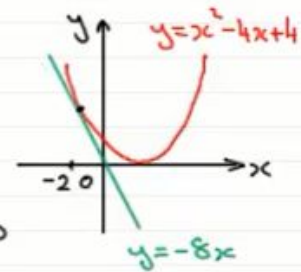
$$\therefore 4+m = \pm 4$$

$$\therefore m = -4 \pm 4$$

$$\therefore m = 0 \text{ or } m = -8$$

when $m = -8$, $x^2 + 4x + 4 = 0$

$$\therefore x = -\frac{4}{2} = -2, \therefore y = 16$$



\therefore Contact $(-2, 16)$

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