Answer on Question #42962, Math, Differential Geometry

A curve has the equation y = x/16 * (5-x)^4. Calculates the values of x for which dy/dx =0 . Given that a small change, p, is made in the x-coordinate at the point (4,0.25), calculate, in terms of p, the approximate change in the y-coordinate .

Answer.

$$y = \frac{x(5-x)^4}{16} \rightarrow \frac{dy}{dx} = \frac{(5-x)^4}{16} - \frac{4x(5-x)^3}{16} = \frac{5(1-x)(5-x)^3}{16}$$

So, $\frac{dy}{dx} = 0$ when $x = 1$ or $x = 5$.

Let $x = 4 + p \rightarrow y(4+p) = \frac{(4+p)(1-p)^4}{16}$.

For small p, $y(4+p) = \frac{4-15p}{16} + O(p^2) = 0.25 - \frac{15}{16}p + O(p^2)$.

Therefore, the approximate change in the y-coordinate is: $\Delta y = -\frac{15}{16}p$.