Mean Value Theorems Ex 15.2 Q5

Here,

$$\text{curve is } y = (x-4)^2$$

Since, it a polynomial function so it is differentiable and continuous. So, it Lagrange's mean value theorem is applicable, so, there exist a point c such that,

$$f'(c) = \frac{f(b)-f(a)}{b-a}$$

$$\Rightarrow \quad 2(c-4) = \frac{f(5)-f(4)}{5-4}$$

$$\Rightarrow \quad 2c-8 = \frac{1-0}{1}$$

$$\Rightarrow \quad 2c = 9$$

$$\Rightarrow \quad c = \frac{9}{2}$$

$$\Rightarrow \quad y = \left(\frac{9}{2}-4\right)^2$$

$$y = \frac{1}{4}$$

Thus, $(c,y) = \left(\frac{9}{2},\frac{1}{4}\right)$ is required point.

Mean Value Theorems Ex 15.2 Q6

Here,

$$y = x^2 + x$$

Since, y is a polynomial function, so it continuous differentiable,

$\Rightarrow$ Lagrange's mean value theorem is applicable, so, there exist a point c such that,

$$f'(c) = \frac{f(b)-f(a)}{b-a}$$

$$\Rightarrow \quad 2c+1 = \frac{f(1)-f(0)}{1-0}$$

$$\Rightarrow \quad 2c+1 = 2$$

$$\Rightarrow \quad c = \frac{1}{2}$$

$$\Rightarrow \quad y = \left(\frac{1}{2}\right)^2 + \frac{1}{2}$$

$$\Rightarrow \quad y = \frac{3}{4}$$

So, $(c,y) = \left(\frac{1}{2},\frac{3}{4}\right)$ is the required point.

Mean Value Theorems Ex 15.2 Q7

Here,

$$y = (x-3)^2$$

Since, y is a polynomial function, so it continuous differentiable,

$\Rightarrow$ Lagrange's mean value theorem is applicable

$\Rightarrow$ There exist a point c such that,

$$f'(c) = \frac{f(b)-f(a)}{b-a}$$

$$\Rightarrow \quad 2(c-3) = \frac{f(4)-f(3)}{4-3}$$

$$\Rightarrow \quad 2c-6 = \frac{1-0}{1}$$

$$\Rightarrow \quad 2c = 7$$

$$\Rightarrow \quad c = \frac{7}{2}$$

$$\Rightarrow \quad y = \left(\frac{7}{2}-3\right)^2$$

$$\Rightarrow \quad y = \frac{1}{4}$$

So, $(c, y) = \left(\frac{7}{2}, \frac{1}{4}\right)$ is the required point.

********** END **********