

### Answer on Question #51482 – Math – Calculus

(a) Given the Cobb Douglas production function

$$Y = AK^{2/3}L^{2/3}$$

where, Y= Output, A=level of technology, K = capital, L= Labour

Find

The marginal product of labour (MPL)

The marginal product of capital (MPK)

Given  $y = \frac{(3x)^2 + 5x}{x^3 + 10x^2}$ , find  $dy/dx$

Compute  $\int_{-3}^7 (2x+5) dx$

#### Solution

$$MPL = \frac{\partial Y}{\partial L} = \frac{\partial}{\partial L} \left( AK^{2/3}L^{2/3} \right) = \frac{2}{3} AK^{2/3}L^{-1/3}$$

$$MPK = \frac{\partial Y}{\partial K} = \frac{\partial}{\partial K} \left( AK^{2/3}L^{2/3} \right) = \frac{2}{3} AK^{-1/3}L^{2/3}$$

$$y = \frac{(3x)^2 + 5x}{x^3 + 10x^2} = \frac{9x + 5}{x^2 + 10x} = \frac{17}{2(x + 10)} + \frac{1}{2x} \rightarrow$$

$$\rightarrow \frac{dy}{dx} = -\frac{17}{2(x + 10)^2} - \frac{1}{2x^2} = -\frac{9x^2 + 10x + 50}{2x^2(x + 10)^2}$$

$$\int_3^7 (2x + 5)dx = (x^2 + 5x)|_{x=3}^{x=7} = 49 + 35 - 9 - 15 = 60$$