

# Questions on Calculus

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1. State the derivative of the following equations

- $y = 2 + 6x$

$$\frac{d(y)}{d(x)} =$$

- $y = 5 - 4x + 2x^3$

$$\frac{d(y)}{d(x)} =$$

- $y = 25 + 6x^2 - 3x^3 + 25x^4$

$$\frac{d(y)}{d(x)} =$$

- $y - 3 = 2x$

$$\frac{d(y)}{d(x)} =$$

- $TPP = 24 + 5L + 2L^2 - L^3$

$$\frac{d(TPP)}{d(L)} =$$

Find the second derivative of the following

- $TU = 25 + X_1 - X_1^2$

$$\frac{d^2(U)}{d(X_1)^2} =$$

- $TU = 25 + 25X_1 - 2X_1^2$

$$\frac{d^2(U)}{d(X_1)^2} =$$

- What can we say about the utility of X?

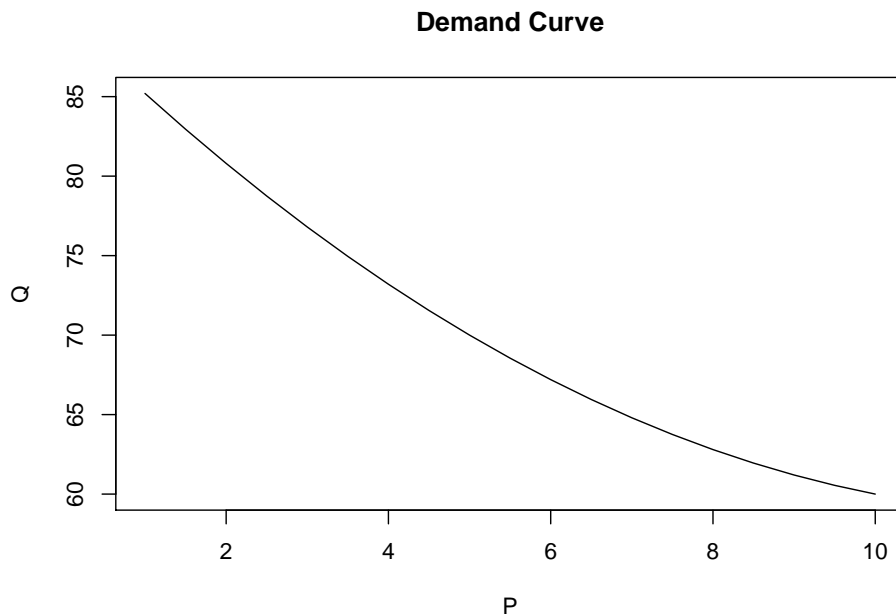
- $TPP = 15 + 15Q + Q^2 - Q^3$

$$\frac{d^2(TPP)}{d(L)^2} =$$

- What does your answer to the previous question tell you about the shape of the Total Physical Product Curve?

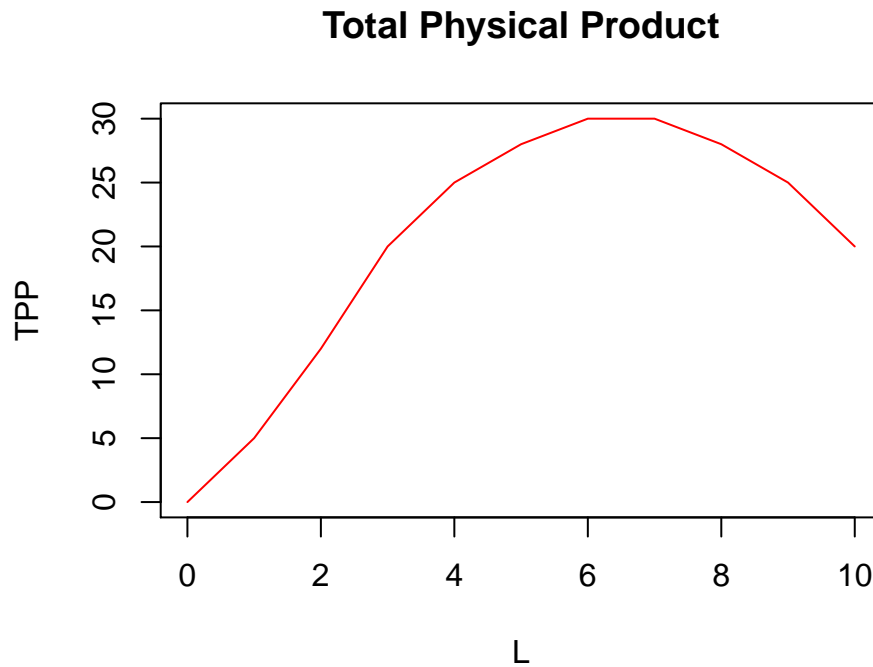
2. Given a demand curve

$$Q_d = 90 - 5P + 0.2P^2$$



What is the elasticity of demand at the point  $P = 5, Q = 70$ ?

3. Here is the total physical product curve..



- How would you calculate the *marginal physical product*?

4. Given the  $TPP = 500 + 200L + L^2 - L^3$ ,

- What is the TPP' or MPP?
- What is the gradient of the TPP at its peak?
- What is the value of the MPP when TPP is at its peak?

5. Given the  $TPP = 100 + 32Q + 23Q^2 - Q^3$ ,

- What is the TPP' or MPP?
- How would you find the maximum TPP? What is the maximum TPP? This can be done with factorisation.

6. Given the  $TPP = 500 + 180Q + 15Q^2 - 2Q^3$ ,

- What is the TPP' or MPP?

$$MPP = 180 + 30Q - 6Q^2$$

- What is the maximum TPP?