

Suppose that for a company manufacturing calculators, the cost, and revenue equations are given by

$$C = 70000 + 30x, \quad R = 200x - \left(\frac{x^2}{20}\right)$$

where the production output in one week is x calculators. If the production rate is increasing at a rate of 500 calculators when the production output is 6000 calculators, find each of the following:

Rate of change in cost = 15000

Rate of change in revenue = -300000

Rate of change in profit = -315000

Solution

$$\frac{dx}{dt} = 500$$

$$\frac{dC}{dt} = \frac{d(70000 + 30x)}{dt} = 30 \frac{dx}{dt} = 30 * 500 = 15000$$

$$\frac{dR}{dt} = \frac{d\left(200x - \left(\frac{x^2}{20}\right)\right)}{dt} = -2 \frac{x}{20} \frac{dx}{dt} = -2 \frac{6000}{20} 500 = -300000$$

$$\frac{dP}{dt} = \frac{dR}{dt} - \frac{dC}{dt} = -300000 - 15000 = -315000$$