Cost Functions - $C(x)$

- marginal cost → the actual cost to produce an additional of a certain commodity given that a plant is already at a certain level of production.

$C(x) - C(x-1)$

- Approximate marginal cost: $C'(x)$ - derivative of cost function
- Average cost - $\overline{C}(x) = \frac{C(x)}{x}$ - Total cost / - units made

Revenue Functions - $R(x)$ → Money Realized by a company from selling x units

- $R(x) = px$ where p is the price per unit.

p can be a constant multiple or another function of x.

- Marginal Revenue - $R'(x)$ - derivative of the revenue function

Profit function → $P(x)$ Revenue - Cost

- $P(x) = R(x) - C(x)$
- Marginal Profit - $P'(x) = R'(x) - C'(x)$

Relative Rate of change → The relative change in quantity is

$$\frac{\text{Change in Quantity}}{\text{Size in Quantity}}$$

(ex) A mortgage rate increases from 10% to 11%.

The relative change would be $\frac{1}{10} = 0.1$ or 10%

10% increase

- Rate of change - Derivatives are rates of change
- Relative rate of change of f at x per unit change in x is

$$\frac{f'(x)}{f(x)} \text{ or } 100 \cdot \left(\frac{f'(x)}{f(x)}\right)\%$$

Problem 1 An economy's consumer price index (CPI) is given by $I(t) = -0.05t^3 + 0.5t^2 + 100$ $(0 \leq t \leq 4)$, t is in years and t=0 refers to the year 2012.

Find the inflation of CPI in 2014.

t=2, for year 2014 $t=0 \rightarrow 2012$ $t=4 \rightarrow 2016$

$$\frac{I'(t)}{I(t)} = \frac{-0.15t^2 + t}{-0.05t^3 + 0.5t^2 + 100} \qquad \frac{I'(2)}{I(2)} = \frac{-0.15(2)^2 + 2}{-0.05(2)^3 + 0.5(2)^2 + 100} \approx .014$$

Inflation in 2014 is 1.4%