

Similarly for Marginal Revenue

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$$\text{Marginal Revenue at } x=x_0 \equiv \left. \frac{dR}{dx} \right|_{x=x_0}$$

estimates: $R(x_0+1) - R(x_0)$

$$\text{Marginal Profit at } x=x_0 \equiv \left. \frac{dP}{dx} \right|_{x=x_0} \text{ estimates}$$

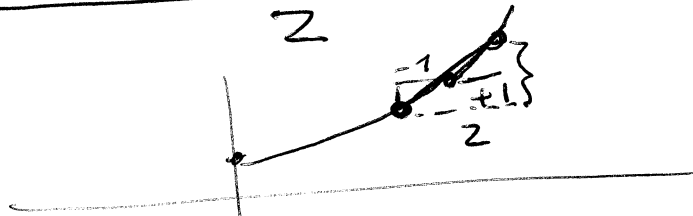
Mathematical Note: Loosely one can consider

$M.C.$ as a rate of change of cost: as a good estimate for the "current cost of producing the x_0 unit using that

$C'(x_0)$ is actually close to either of the follows

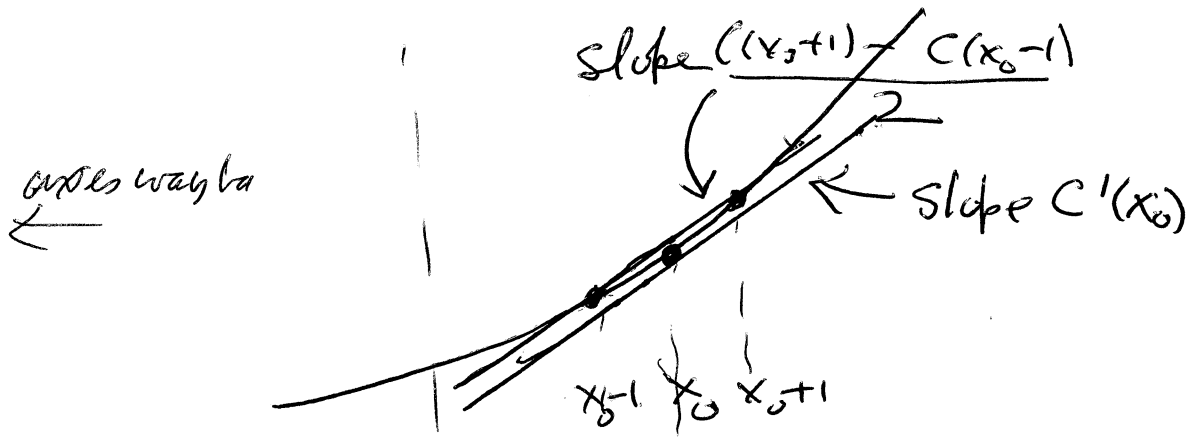
$$\frac{C(x_0+1) - C(x_0)}{2} \text{ average cost of } \text{if needed} \text{ producing } \text{to produce units } x_0 \text{ \& } x_1$$

$$= \frac{[C(x_0+1) - C(x_0)] + [C(x_0) - C(x_0-1)]}{2}$$



or even better $\frac{C(x_0+\frac{1}{2}) - C(x_0-\frac{1}{2})}{1}$

BIG PICTURE



Example 2.5 Problems

- (a) MC and MR
- (b) estimate cost of producing 4th unit
- (c) Actual cost of producing 4th unit $\approx \frac{dC}{dx} \Big|_{x=3}$
- (c) Actual

(d) Use MR to estimate "revenue derived from sale of 4th unit"

(e) Actual revenue from price 40

$$C(x) = \frac{1}{3}x^2 + 2x + 30$$

$$p(x) = -x^2 - 4x + 80$$

$$R(x) = x p(x) = -x^3 - 4x^2 + 80x$$

$$\frac{dC}{dx} = \frac{2}{3}x + 2$$

"Marginal price" is not usual language

$$\frac{dR}{dx} = -3x^2 - 8x + 80$$

$$\frac{dR}{dx} \Big|_{x=3}$$

Prob 11 Total cost

$$C(q) = 0.1q^3 - 0.5q^2 + 500q + 200$$

Marginal analysis to estimate "cost of manufacturing 4th unit"

$$\left[\frac{dC}{dq} \Big|_{q=3} \right]$$

Actual ...

12 13 units

