ECONOMICS EXAMPLES: \( x = \text{units produced/sold} \)

- \( P(x) = \text{revenue fnx} \)
- \( R'(x) = \text{marginal revenue} \)
- \( R(x) = \text{average revenue} \)
- \( C(x) = \text{cost fnx} \)
- \( C'(x) = \text{marginal cost} \)
- \( C(x) = \text{avg. cost} \)
- \( P(x) = \text{profit fnx} \)
- \( P'(x) = \text{marginal profit} \)
- \( P(x) = \text{avg. profit} \)

MAXIMIZE PROFIT: \( P(x) = R(x) - C(x) \)

\[
P'(x) = R'(x) - C'(x)
\]

\[
0 = R'(x) - C'(x)
\]

\[
R'(x) = C'(x)
\]

\[
\text{max. rev.} = \text{marg. cost.}
\]

1. **Suppose** \( C(x) = 500,000 + 80x + 0.003x^2 \)

\[
R(x) = \frac{200x}{x} \quad \text{sell each item for \$200}
\]

Max. capacity: 30,000 units \( \Rightarrow D: x \in [0, 30,000] \)

\[
P(x) = \frac{500,000 + 80x + 0.003x^2}{x} + 200
\]

\[
p'(x) = -0.006x + 120 = 0
\]

\[
x = 20,000
\]

\[
p''(x) = -0.006 < 0
\]

\[
\therefore \text{max at } x = 20,000
\]

You're a rancher in Texas. You have 20 steer/acre on your ranch. Steers weigh 2000 lb. each. Weight decreases by 50 lbs. for each additional steer/acre. How many steer/acre will maximize the total market weight?

\[
D: x \in [20, 60]
\]

\[
W(x) = \left( \text{# steers} \right) \times \text{weight/steer}
\]

\[
= x \left( 2000 - 50(x-20) \right)
\]

\[
= -50x^2 + 9000x
\]

\[
w' = -100x + 3000 = 0
\]

\[
x = 30
\]

\[
w'' = -100 < 0 \Rightarrow \text{max at } x = 30
\]

30 steer will maximize market weight.

The max. market weight is \( W(30) \)

\[
= 45,000 \text{ lbs.}
\]