

Math 157 - Quiz 11

November 16, 2016

Name key

Score _____

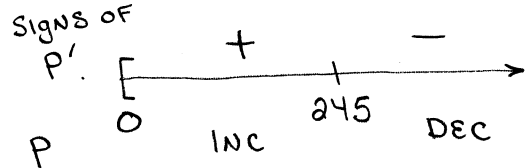
Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) The revenue from selling q items is $R(q) = 500q - q^2$ and the total cost is $C(q) = 150 + 10q$. Find the quantity that maximizes profit. What is the total profit at that production level? Explain or show that you have indeed found a global maximum.

$$P(q) = R(q) - C(q) = 500q - q^2 - 150 - 10q$$
$$= 490q - q^2 - 150$$

$$P'(q) = 490 - 2q = 0$$

$$\Rightarrow q = 245$$



Since $q = 245$ is the only crit pt, it must give an abs. max.

$$P(245) = 59875$$

2. (3 points) The revenue from selling q items is $R(q) = 30q + 5$ and the total cost is $C(q) = 0.01q^3 - 0.7q^2 + 34q + 8$.

- (a) Determine the profit function $P(q)$.

$$P(q) = 30q + 5 - 0.01q^3 + 0.7q^2 - 34q - 8$$

$$P(q) = -0.01q^3 + 0.7q^2 - 4q - 3$$

- (b) Determine the marginal profit.

$$P'(q) = -0.03q^2 + 1.4q - 4$$

- (c) Determine the marginal profit at $q = 25$. Based on your value should you increase or decrease production in order to increase profit? Why?

$$P'(25) = 12.25$$

INCREASE PRODUCTION!

P IS INCREASING AT $q = 25 \Rightarrow$ A MAX OCCURS TO THE RIGHT OF $q = 25$.

$P'(25)$ IS +

3. (4 points) A car initially going 40 ft/sec brakes and slows at a constant rate so that it comes to a stop in 5 seconds. Its velocity over the 5-second interval is given by

$$V(t) = 40 - 8t,$$

where t is in seconds and $V(t)$ is in ft/sec.

- (a) Make a table of values showing the velocity at $t = 0, 1, 2, 3, 4, 5$.

t	0	1	2	3	4	5
$V(t)$	40	32	24	16	8	0

- (b) Use a left sum to estimate the distance traveled by the car over the 5-sec interval.

$$D \approx 40(1) + 32(1) + 24(1) + 16(1) + 8(1)$$

$$= \boxed{120 \text{ FT}}$$

- (c) Use a right sum to estimate the distance traveled by the car over the 5-sec interval.

$$D \approx 32(1) + 24(1) + 16(1) + 8(1) + 0(1)$$

$$= \boxed{80 \text{ FT}}$$

- (d) Sketch the graph of V over the 5-sec interval. Then use rectangles to illustrate either the left sum or the right sum. Indicate which one you illustrate.

