

Group Members:

Solutions

1	2	3	Total

Nov 2, 2007

Math 124 Section 16

QUIZ 8

Show your work in all problems.

1. The rate of change in the amount of water in a water tower is given by $r(t)$ gallons per minute where t is minutes since 1pm. If initially there are 500 gallons in the tower answer the following.

(a) When is the amount of water decreasing?

on $[4.2, 7]$, which means about from 12 seconds after 1:04 pm to 1:07 pm

(b) Find the amount of water in the tower at 1:10pm.

$W(t)$ = amount of water t minutes after 1pm
 $r(t) = W'(t)$

$$\int_0^{10} r(t) dt = \text{areas above} - \text{areas below} = 8.5 \times 10 + 4.5 \times 10 - 1.5 \times 10 = 115 \text{ gallons}$$

$$115 = W(10) - W(0) \longrightarrow W(10) = 500 + 115 = 615 \text{ gallons at 1:10pm}$$

2. The marginal cost for a company is given by $MC = 40 + 20 \cdot .98^q$ dollars per item. The total cost for 200 items is 20000 dollars.

(a) Find the additional cost if the company increases production from 200 to 250.

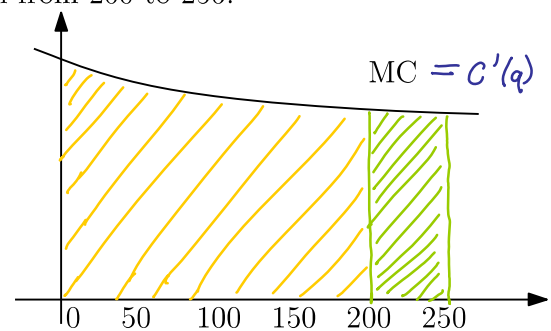
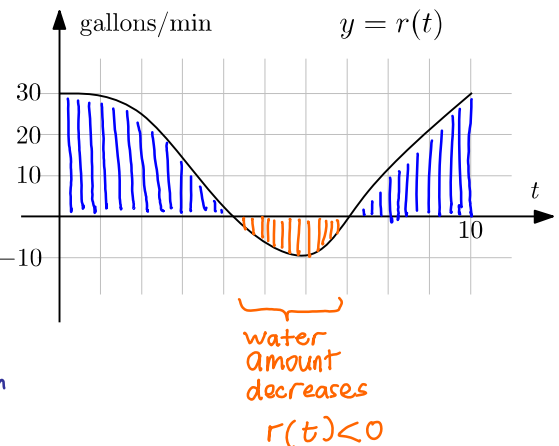
$$\begin{aligned} C(250) - C(200) &= \int_{200}^{250} C'(q) dq \\ &= \int_{200}^{250} 40 + 20 \cdot .98^q dq \\ &= 2011.07 \text{ dollars} \end{aligned}$$

(b) What is the fixed cost?

$$C(0) = ?$$

$$\underbrace{C(200)}_{20000} - \underbrace{C(0)}_{=?} = \int_0^{200} C'(q) dq = 8972.55$$

$$C(0) = C(200) - 8972.55 = 20000 - 8972.55 = 11027.45 \text{ dollars}$$



3. Using the graph for $f'(x)$ given below, sort the following numbers in increasing order.

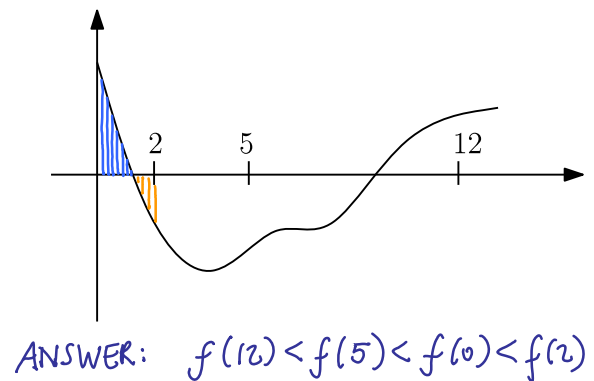
$$f(0), f(2), f(5), f(12)$$

To compare $f(0)$ and $f(2)$, we check if $f(2) - f(0)$ is positive or negative.

$$f(2) - f(0) = \int_0^2 f'(x) dx > 0 \quad (\text{area above} > \text{area below})$$

hence $f(2) > f(0)$

Similarly we see $f(5) < f(0)$, $f(12) < f(5)$



ANSWER: $f(12) < f(5) < f(0) < f(2)$