

Essentials of Calculus

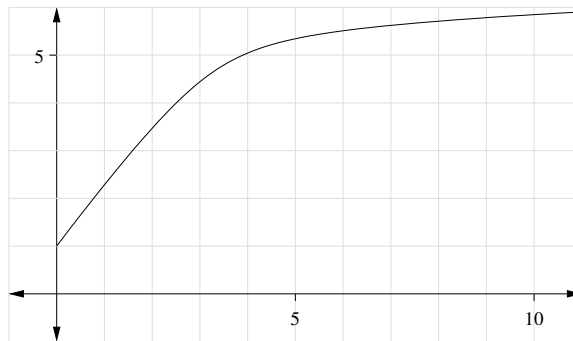
Homework 2.5

Marginal cost and revenue

1. The cost (in dollars) of making q pencils is $C(q)$.
 - a) What are the units of the marginal cost?
 - b) What would it mean for the marginal cost to be $MC = 2$ for $q = 200$?
2. It costs \$200 to produce 50 hammers and \$250 to produce 55 hammers. Approximate the marginal cost at a production level of 50 hammers.

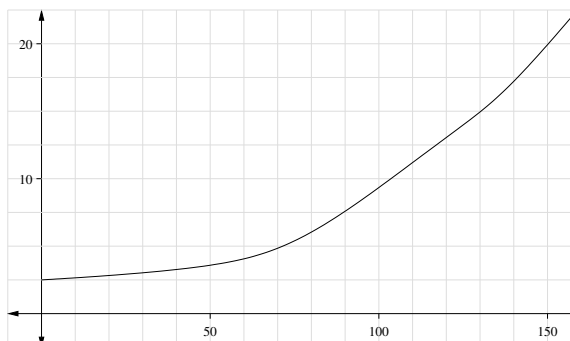
Numeric answer: $MC(50) \approx 10$ dollars/hammer

3. The graph of the cost in dollars to make q items is given below.



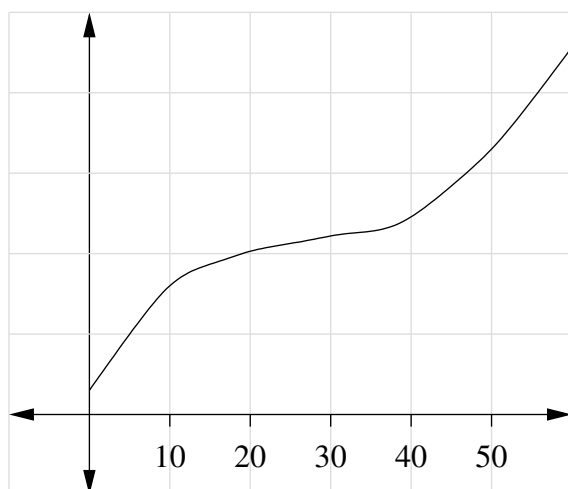
Estimate the marginal cost at a production level of 5 items. Give the units and interpret the result.

4. The graph of the cost in dollars to make q pens is given below.



Estimate the marginal cost at a production level of 50 items. Give the units and interpret the result.

5. The graph of the cost in dollars to make q items is given below.



- a) Which is larger, $MC(10)$ or $MC(30)$? Explain.

Numeric answer: $MC(10)$ is larger than $MC(30)$.

- b) Which is larger, $MC(20)$ or $MC(50)$? Explain.

Numeric answer: $MC(50)$ is larger than $MC(20)$.

6. The cost of making q gallons of carbonated beverage is given by the following table.

q (gallons)	100	200	300	400
$C(q)$ (dollars)	250	360	460	540

Approximate the marginal cost at $q = 200$ gallons, including the units.

Numeric answer: $MC(200) \approx 1$ dollar/gallon.

7. The revenue from selling q items is $R(q)$, where $R(20) = 200$ and $MR(20) = 15$. Approximate the revenue obtained by selling 21 items and 19 items.

Numeric answer: $RC(21) \approx 215$

$RC(19) \approx 185$

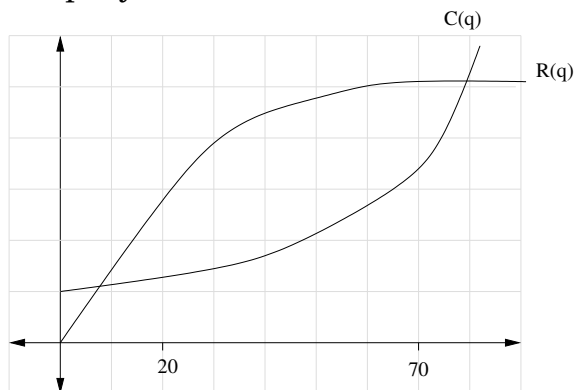
8. a) Suppose a company is making 200 items, and $MC(200) = 15$ and $MR(200) = 20$. About how much additional profit would it get from making one more item?

Numeric answer: There would be about 5 money units additional profit.

- b) Suppose a company is making 100 items, and $MC(100) = 12$ and $MR(100) = 10$. Should it make an additional item? Why or why not?

- c) Suppose a company is making 300 items, and $MC(300) = 25$ and $MR(300) = 31$. Should it make an additional item? Why or why not?

9. The following graph shows the cost and revenue functions for a company.



- a) If the company makes 20 items, should it make another?
Explain your answer using marginal cost and marginal revenue.
- b) If the company makes 70 items, should it make another?
Explain your answer using marginal cost and marginal revenue.

10. A company has a cost function $C(q)$ and revenue function $R(q)$, with $C(100) = 150$, $R(100) = 200$, $MC(100) = 10$ and $MR(100) = 12$.

- a) What is the profit at $q = 100$?

Numeric answer: The profit is 50 money units.

- b) If the production level increases from 100 to 101, by about how much does the profit change?

Numeric answer: The profit changes by about 2 money units.