

Math 103 Fall 2007: Practice Midterm I.

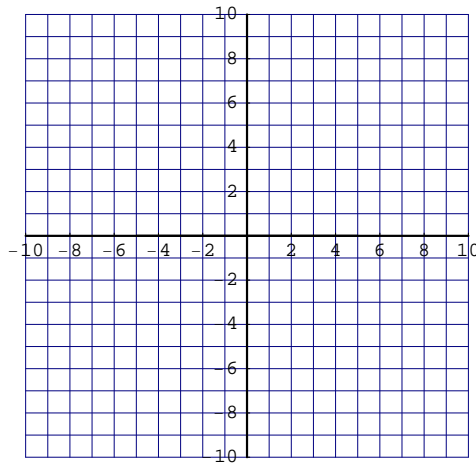
General Instructions: You are allowed your cheatsheet (one page, front only). NO Calculators. Please show all your work, unless explicitly instructed not to do so. Please ask if you are not sure of anything on the exam. You have 50 minutes.

1. Consider the line through $(2, 3)$ and $(7, 4)$.

(a) Fill in the following:

<u>Answer</u>	
Write an equation for the line.	
What is the x -intercept?	

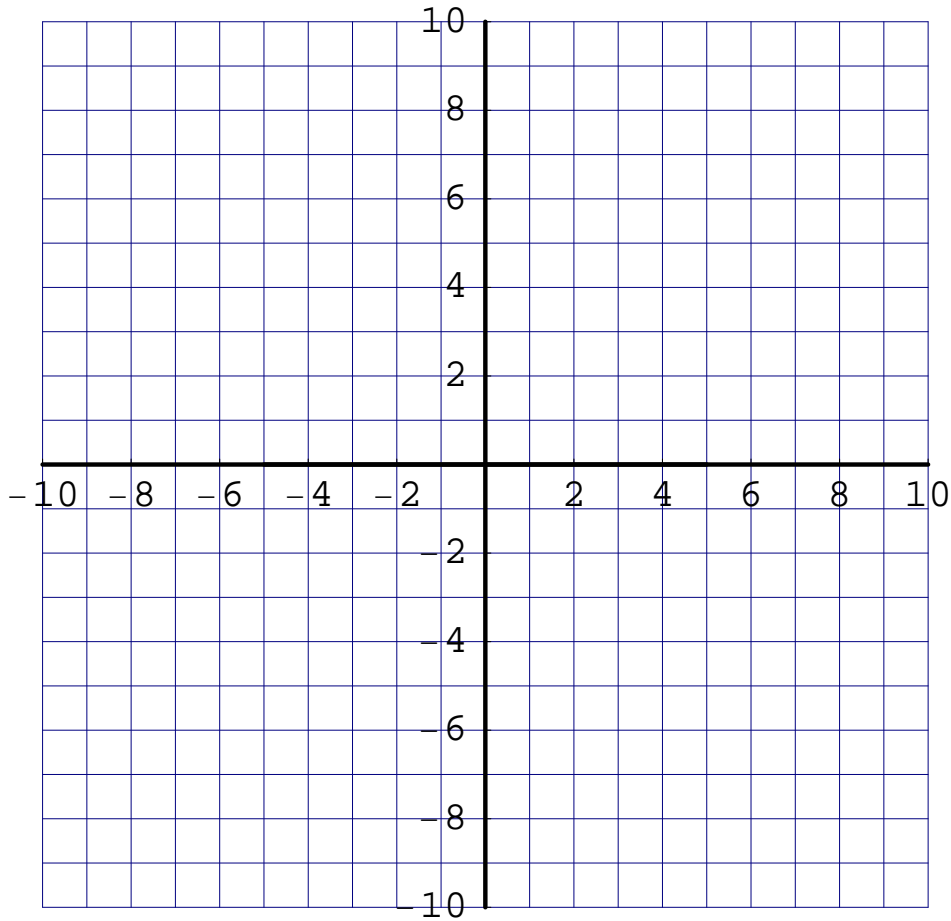
(b) On the axes below graph this line. Be sure to label two points.



Work Space:

2. Consider the function $f(x) = -\frac{1}{2}|x - 4|^2 + 8$.

(a) On the axes below graph $y = -\frac{1}{2}|x - 4|^2 + 8$. Be sure to label the vertex, and one other point.



(b) Details

Answer

What is the range of $f(x) = -\frac{1}{2} x - 4 ^2 + 8$?	
What are the x -intercepts, if any?	

3. Consider the cost function $C(x) = x^2 + 2x$ for a (inexpensive) car manufacturer where x is measured in number of cars and $C(x)$ is measured in thousands of dollars.

(a) What is the cost of producing 100 cars?.

Summary:

(b) Evaluate and simplify $C(x + 1) - C(x)$.

Answer:

(c) Explain what $C(15) - C(14)$ means.

Summary:

4. My children and I are developing a story book. It will cost us \$9 to develop the book and \$2 per copy to reproduce them. Being stingy, I plan to sell these books to my friends and family with a price-demand function of $p(x) = 12 - 2x$, where x is the quantity of books sold.

(a) Write a cost function $C(x)$ for the books.

Answer:

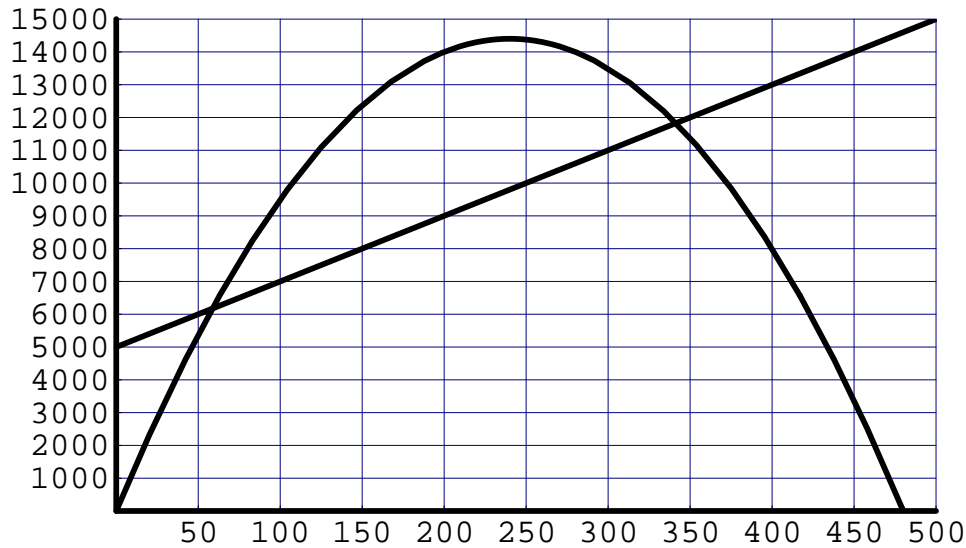
(b) Write an expression $R(x)$ for revenue as a function of x .

Answer:

(c) Write an expression $P(x)$ for profit as a function of x .

Answer:

5. The graphs of the revenue and cost functions for the production and sale of x units are shown below. The cost function is the straight line and the revenue function is the curve.



- (a) Use the graph to estimate the production level x that maximizes the profit.

Answer:

- (b) Mark the points $(x, C(x))$ and $(x, R(x))$ on the graphs of the cost and revenue functions corresponding to the value of x that maximizes profit.
- (c) What is the maximum profit and what output level will achieve this?

Summary:

6. Let x be the number of cameras we produce and let $P(x) = -2x^2 - 8x + 6$ be our profit function measured in thousands of dollars.

- (a) What are the break even points?

Answer:

(b) At what output levels will we make a profit?

Summary:

7. Rubio Canyon uses the rates shown below to compute the monthly cost of water for each customer.

\$0.50 per gallon	for the first 500 gallons
\$1.00 per gallon	for all gallons over 500

(a) Let $C(x)$ be the monthly cost of using x gallons of water. Find the following:

i. What is the monthly cost of using 500 gallons of water?

Answer:

ii. What is the monthly cost of using 501 gallons of water?

Answer:

(b) Write a piecewise definition for the cost of consuming x gallons of water.

$$C(x) = \begin{cases} & \text{if } \leq x \leq \\ & \text{if } x < \end{cases}$$