

NAME: \_\_\_\_\_

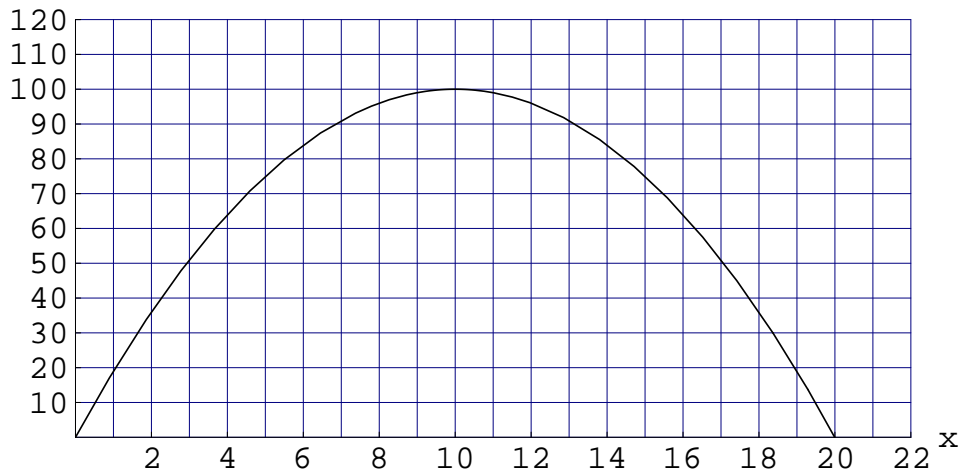
Math 103L: Graphing (Section 2.2)

These problems are a sample of the kinds of problems that may appear on the final exam. Some answers are included to indicate what is expected. Problems that require a summary statement are marked with Sum. The summary statements should be written in complete sentences and they should include the units of measurement for all quantities mentioned in the summary.

1. A company manufactures and sells  $x$  wigits per week. The weekly price-demand and cost functions are:

$$\begin{aligned} p(x) &= 20 - x \\ C(x) &= 25 + 5x \end{aligned}$$

where both price and cost are given in dollars. The revenue function  $R(x)$  is graphed below:



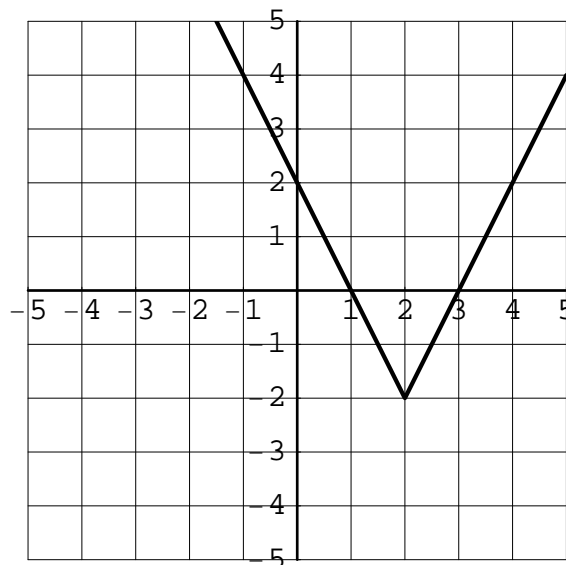
- (a) From the graph, what is the revenue if the company sells 8 wigits per week?
- (b) Write an expression for the revenue function,  $R(x)$ .
- (c) Graph the cost function,  $C(x)$ , on the graph above.
- (d) Mark the break-even points on the graph.
- (e) Shade the region where the company makes a profit.

2. **Sum** The graph of a cost function is show below. The cost  $C(x)$  to produce  $x$  units has two parts: the fixed cost  $F$ , and the variable (per unit) cost  $V$ . Determine the values of  $F$  and  $V$  from the graph. Explain how you found  $F$  and  $V$  from the graph.



3. The graph of an absolute-value function  $f(x)$  is shown below.

|                          |  |
|--------------------------|--|
| Find the $y$ -intercept  |  |
| Find the $x$ -intercepts |  |
| Find $f(2)$              |  |



4. Relative to the graph of

$$y = 3|x| + 1,$$

the graphs of the following equations have been changed in what way?

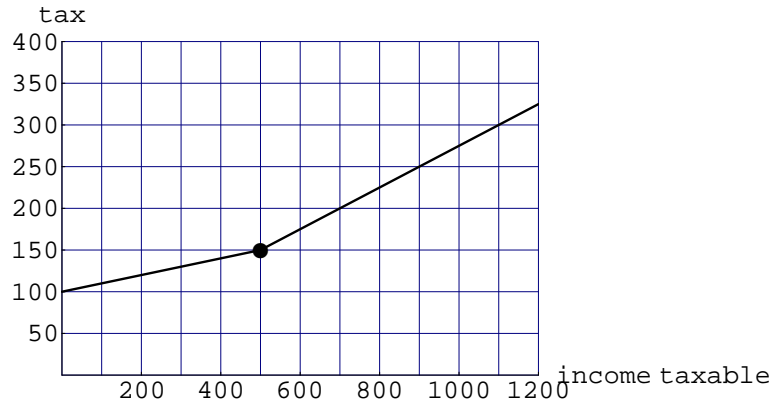
Answer



|  |                           |
|--|---------------------------|
|  | 1. $y = 3 x - 5  + 1$     |
|  | 2. $y = (3/5) x  + (1/5)$ |
|  | 3. $y = 3 x  + 6$         |

|   |                                       |
|---|---------------------------------------|
| A | shifted 5 units right                 |
| B | shifted 5 units left                  |
| C | stretched vertically by a factor of 5 |
| D | shrunk vertically be a factor of 1/5  |
| E | shifted 5 units up                    |
| F | shifted 5 units down                  |

5. The following graph shows the amount of tax  $T(x)$  (in dollars) for a taxable income of  $x$  (in dollars).



**Sum** What is the tax rate for incomes over \$500? Give your answer as a percentage and explain how you calculated it.

6. There is an income tax on the planet Bozone. Both annual income,  $x$ , and income tax,  $T(x)$ , are measured in the local currency, the Bozat ( $\mathfrak{B}$ ). The Bozonian tax table is shown below.

| Between             | But Not Over        | Base Tax          | Rate | Of the<br>Amount Over |
|---------------------|---------------------|-------------------|------|-----------------------|
| $\mathfrak{B}0$     | $\mathfrak{B}1,000$ | 0                 | 10%  | $\mathfrak{B}0$       |
| $\mathfrak{B}1,000$ | $\mathfrak{B}2,500$ | $\mathfrak{B}100$ | 20%  | $\mathfrak{B}1,000$   |

- (a) The equation for the income tax on income between  $\mathfrak{B}1,000$  and  $\mathfrak{B}2,500$  is of the form  $T(x) = mx + b$ . Find the values of  $m$  and  $b$ .

$$m = \underline{\hspace{2cm}}, \quad b = \underline{\hspace{2cm}}$$

- (b) Draw an accurate graph of the tax function  $T(x)$ .

