Practice Problems for Math Success

Linear Functions

These **practice problems** are designed to help you **prepare for our course exams** and **assess your understanding** of the course material at the expected level. Aim to complete them **in class, during tutoring, office hours, or on your own**, and try to solve them **without notes or a calculator**, just like on the **actual exams**. Remember, **practice makes perfect**, so don't hesitate to **ask for help** if you get stuck.

1. Determine whether each of the following statements is TRUE or FALSE. Explain your reasoning.

   (a) g could be a linear function.

x	$g(x)$
-2	5
-1	2.5
2	-5
4	-10

   (b) $y = \frac{2}{3}x - 7$ and $3y - 2x = 30$ are parallel lines.

   (c) $y = -5x + 2$ and $y = -\frac{1}{5}x + 1$ are perpendicular lines.

   (d) If two lines intersect at a point, then they are perpendicular.

   (e) If two lines have no points in common, then they must have the same slope and intercepts.

2. A company has found that the number of units it sells, S, is a linear function of the amount of money that it spends on advertising, M. If it spends no money for advertising, it sells 300 units. For each additional \$5000 spent on advertising, an additional 20 units are sold. Answer the following questions. You must show all of your work.

   (a) How many units does the firm sell if it spends \$35,000 on advertising?

   (b) How much advertising money must be spent to sell 950 units?

3. John has \$72 and wants to spend it all on pizza and soda from a local pizzeria. A pizza costs \$12 and a six-pack of soda costs \$6. The number of pizzas that John can afford, p, is a function of the number of six-packs of soda that he decides to buy, s. Indicate whether the following statements are TRUE or FALSE. Explain your reasoning.

   (a) An equation that represents the information given above is $12 - 2p - s = 0$.

   (b) The slope is -2 and represents that if two fewer six-packs of soda is purchased, then 1 additional pizza can be purchased.

   (c) The s-intercept is 12 and the p-intercept is 24.

   (d) The slope is $-\frac{1}{2}$ and represents that if one additional pizza is purchased, then 2 less six-packs can be purchased.

   (e) The s-intercept is 24 and represents that if no pizza is purchased, then 24 six-packs of soda can be purchased.

4. Let t be the time in seconds and let $r(t)$ be the **rate**, in gallons per second, that water enters a reservoir:

$$r(t) = 800 - 40t.$$

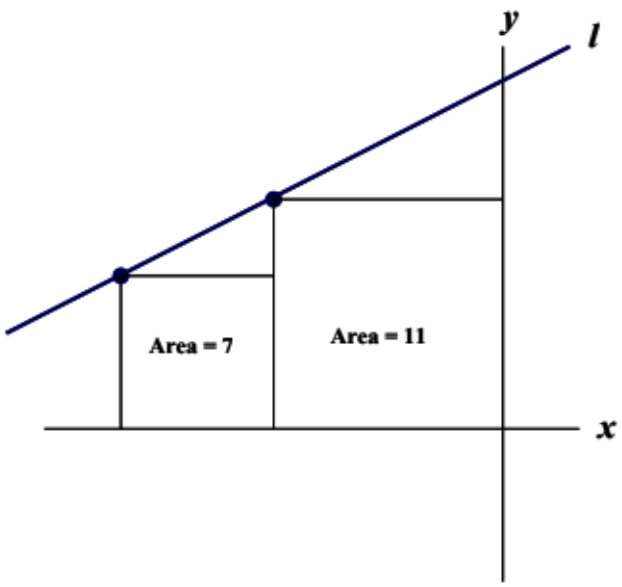
   (a) Sketch the graph of $r(t)$ on the interval $0 \leq t \leq 30$. Label the axes and indicate the vertical and horizontal intercepts.

   (b) The meaning of the slope in the context of this problem is:

   (c) On the interval $0 \leq t \leq 30$, when does the reservoir have the most water?

   (d) On the interval $0 \leq t \leq 30$, when does the reservoir have the least amount of water?

5. Find the equation of the line l in the figure below. Give the **exact** value of the slope and y-intercept. The shapes under the line are squares. You must show all of your work.



The exact value of the slope is _____.

The exact value of the y-intercept is _____.