

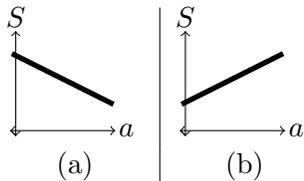
Name: \_\_\_\_\_

**Directions:** Show all work. No credit for answers without work.

1. [**3 parts, 1 point each**] The number of sales per month,  $S$ , is a function of the amount,  $a$  (in dollars), spent on advertising that month, so  $S = f(a)$ .

(a) Translate the statement  $f(2500) = 1800$  into English.

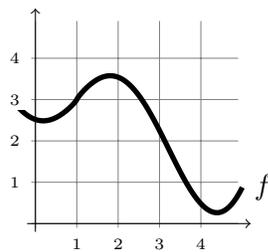
- (b) Which graph is more likely to represent this function? Answer (a) or (b).



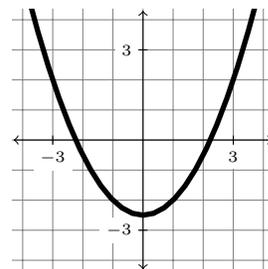
- (c) What does the vertical intercept of the graph of this function represent, in terms of sales and advertising?

2. [**2 parts, 1 point each**]

- (a) Estimate the average rate of change of  $f$  from  $x = 1$  to  $x = 4$ .



- (b) Find the value(s) of  $x$  so that  $f(x) = 1$ .



3. [**2 points**] Steve's resting heart rate is 75 beats per minute. At time  $t = 0$ , Steve begins a 30 minute workout. After 25 minutes, Steve's heart reaches its maximum rate of 140 beats per minute, at which point Steve begins his cool-down routine and his heart rate declines. Draw a graph of Steve's heart rate  $H$  as a function of time  $t$ . Label your axes and provide units.
4. [**3 parts, 1 point each**] A city's population was 41,250 in the year 2000 and is growing by 550 people per year.
- (a) Give a formula for the city's population  $P$  as a function of the number of years  $t$  since 2000.
- (b) What is the population predicted to be in 2015?
- (c) When is the population expected to reach 80,000?