

**Exercise 53**

The cost of producing  $x$  ounces of gold from a new gold mine is  $C = f(x)$  dollars.

- (a) What is the meaning of the derivative  $f'(x)$ ? What are its units?
  - (b) What does the statement  $f'(800) = 17$  mean?
  - (c) Do you think the values of  $f'(x)$  will increase or decrease in the short term? What about the long term? Explain.
- 

**Solution**

- (a)  $f'(x)$  is the cost of producing an additional ounce of gold after  $x$  ounces are produced (also known as marginal cost). The units of  $f'(x)$  are dollars per ounce.
- (b)  $f'(800) = 17$  indicates that once the 800th ounce of gold produced, the cost is \$17 per ounce of gold.
- (c) The more that gold is mined, the more scarce it will become, making it more costly to mine. Therefore,  $f'(x)$  is smaller in the short term and larger in the long term.