

The cost (in dollars) of producing  $x$  units of a certain commodity is  $C(x) = 5000 + 6x + 0.05x^2$ .

Find the average rate of change of  $C$  with respect to  $x$  when the production level is changed from  $x = 100$  to the given value.  
(Round your answers to the nearest cent.)

①  $x = 103$

②  $x = 101$

Each limit below represents the derivative of some function  $f$  at some number  $a$ , find them.

$$\text{a) } \lim_{h \rightarrow 0} \frac{(16 + h)^{1/4} - 2}{h}$$

$$\text{b) } \lim_{x \rightarrow \pi/4} \frac{\tan(x) - 1}{x - \pi/4}$$

$$\text{c) } \lim_{t \rightarrow 1} \frac{t^5 + t - 2}{t - 1}$$

The number of gallons of water in a tank  $t$  minutes after the tank has started to drain is  $Q(t) = 200(30 - t)^2$ .

- ①
  - ① What is the average rate at which the water flows out during the first ten minutes?
  - ② during the five minutes from  $t = 5$  to  $t = 10$ ?
  - ③ during the two minutes from  $t = 8$  to  $t = 10$ ?
  - ④ during the minute from  $t = 9$  to  $t = 10$ ?
- ② Estimate how fast the water is running out of the tank at the end of ten minutes.
- ③ Draw a graph of the function  $Q$  for  $0 \leq t \leq 20$ . Draw the secant lines for the four time intervals used in part a). What are their slopes?

The cost (in dollars) of producing  $x$  units of a certain commodity is  $C(x) = x^2 - 2x + 10$ .

- a) Find the average rate of change of  $C$  with respect to  $x$  when the production level is changed from  $x = 5$  to  $x = 7$  and for the change from  $x = 5$  to  $x = 6$ .
  
- b) Find the instantaneous rate of change of  $C$  with respect to  $x$  when  $x = 5$ .