

### 9.3 Average Value

Calculus

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

**CA #1**

**Find the average value of each function on the given interval.**

1.  $f(x) = \sqrt{x}$  on  $[1, 9]$

2.  $f(x) = \frac{1}{x^2}$  on  $[1, 5]$

3.  $f(x) = \cos(2x)$  on  $\left[\frac{\pi}{3}, \pi\right]$

**On the given interval, find the  $x$ -value where the function is equivalent to the average value on that interval.**

4.  $f(x) = -2x + 1$  on  $[0, 4]$

5.  $f(x) = 2\sqrt{x}$  on  $[0, 1]$

**Find the average rate of change on the given interval.**

6.  $f(x) = \frac{1}{x-2}$  on  $[-4, -1]$

7.  $y = -x^2 + x + 2$  on  $[-1, 2]$

**For 8-9, find where the instantaneous rate of change is equivalent to the average rate of change.**

8.  $y = -\frac{1}{2}x^2 + 2x - 1$  on  $[1, 4]$

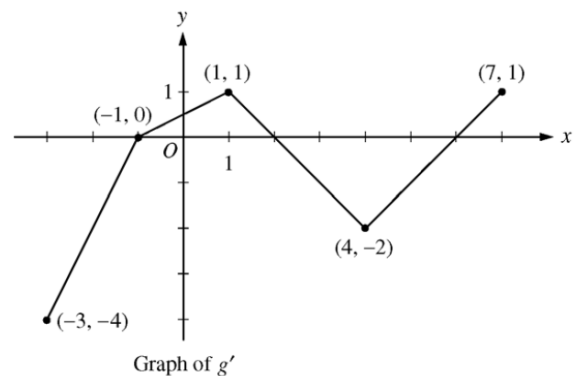
9.  $y = -\sqrt{5x + 15}$  on  $[-3, -1]$

10. 2008 B Q5 c-d

Let  $g$  be a continuous function with  $g(2) = 5$ . The graph of the piecewise-linear function  $g'$ , the derivative of  $g$ , is shown above for  $-3 \leq x \leq 7$ .

(c) Find the average rate of change of  $g(x)$  on the interval  $-3 \leq x \leq 7$ .

(d) Find the average rate of change of  $g'(x)$  on the interval  $-3 \leq x \leq 7$ .



11. 2008 A Q2 b



|                 |     |     |     |     |     |    |   |
|-----------------|-----|-----|-----|-----|-----|----|---|
| $t$ (hours)     | 0   | 1   | 3   | 4   | 7   | 8  | 9 |
| $L(t)$ (people) | 120 | 156 | 176 | 126 | 150 | 80 | 0 |

Concert tickets went on sale at noon ( $t = 0$ ) and were sold out within 9 hours. The number of people waiting in line to purchase tickets at time  $t$  is modeled by a twice-differential function  $L$  for  $0 \leq t \leq 9$ . Values of  $L(t)$  at various times  $t$  are shown in the table above.

(b) Use a trapezoidal sum with three subintervals to estimate the average number of people waiting in line during the first 4 hours that tickets were on sale.

Answers to 9.3 CA #1

|                   |                  |                              |   |  |                    |
|-------------------|------------------|------------------------------|---|--|--------------------|
| 1. $\frac{13}{6}$ | 2. $\frac{1}{5}$ | 3. $-\frac{3\sqrt{3}}{8\pi}$ | 4. Avg Val: $-3$<br>$c = 2$                 | 5. Avg Val: $\frac{4}{3}$<br>$c = \frac{4}{9}$ | 6. $-\frac{1}{18}$ |
| 7. 0              | 8. $\frac{5}{2}$ | 9. $-\frac{5}{2}$            | 10. (c) $-\frac{3}{5}$<br>(d) $\frac{1}{2}$ | 11. 155.25 people                              |                    |