Average Rates of Change

1. Which function below provides the average rate of change for the function $f(t) = 3 - 2\sqrt{t}$ on the input interval from t to $t + 27$?

   a. $g(t) = \dfrac{3 - 2\sqrt{t+27} - \left(3 - 2\sqrt{t}\right)}{27}$

   b. $g(t) = -\dfrac{6 + 2\sqrt{27+t}}{t}$

   c. $g(t) = \dfrac{6 - 2\sqrt{t+27} - 2\sqrt{t}}{27}$

   d. $g(t) = \dfrac{6 - 2\sqrt{27+t}}{t}$

   e. $g(t) = -\dfrac{3 - 2\sqrt{27+t}}{3 - 2\sqrt{27}}$

2. An object is moving forward along a straight line. The distance the object has traveled (in meters) from its starting position t seconds after it started moving is given by $s(t) = 2\sqrt{t}$. What is the average velocity of the object over the interval from $t = 4$ to $t = 9$.

   a. 5 b. 1 c. $\dfrac{2}{5}$ d. 2 e. $\dfrac{5}{2}$

3. Missy is running a 200 meter race. She runs the first 120 meters at a constant speed of k meters per second and she runs the last 80 meters at a constant speed of l meters per second. Which of the following expressions represents Missy's average speed over the entire race?

   a. $\dfrac{k+l}{2}$

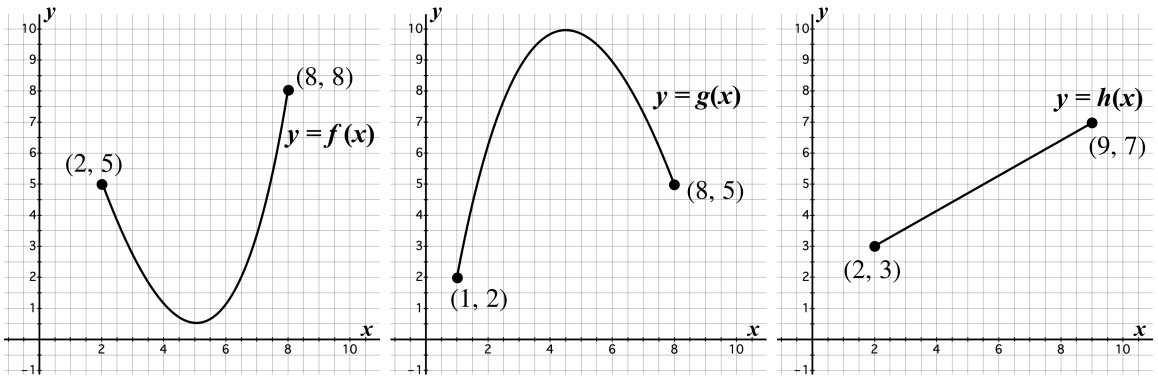
   b. $\dfrac{200}{\left(\frac{120}{k} + \frac{80}{l}\right)}$

   c. $\dfrac{120k + 80l}{200}$

   d. $\dfrac{k\left(\frac{120}{200}\right) + l\left(\frac{80}{200}\right)}{2}$

   e. None of these

4. The functions f, g, and h are graphed on separate axes below.



Let A_f, A_g, and A_h respectively represent the average rate of change of each function over the particular closed interval displayed in the graph. Which of the following is true?

a. $A_f = A_g = A_h$

b. $A_h < A_g < A_f$

c. $A_f < A_h < A_g$

d. $A_g < A_f < A_h$

e. $A_f < A_g < A_h$

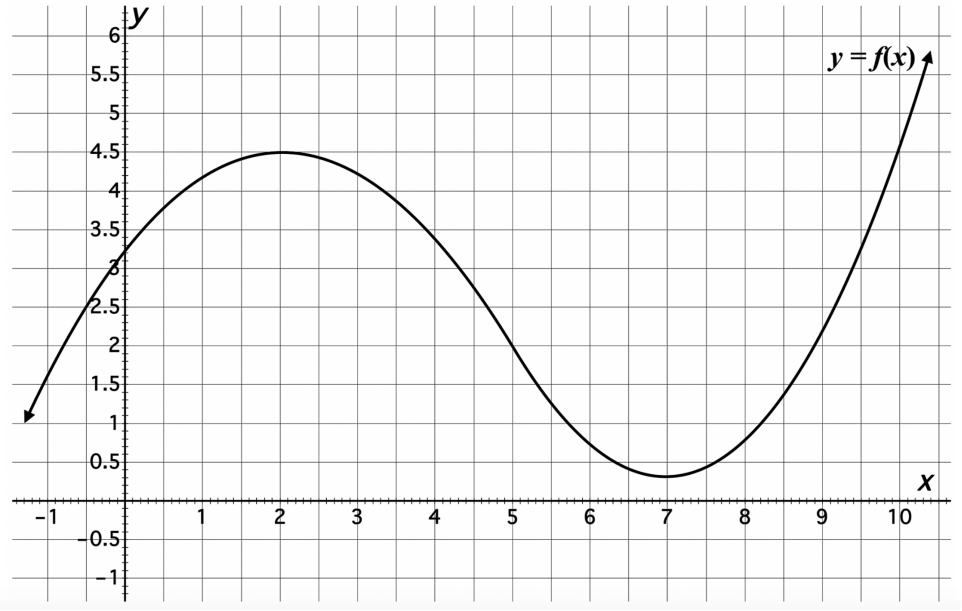
5. When running a marathon you heard the timer call out 12 minutes as you passed the second mile-marker.

(a) As you passed mile-marker 5 you heard the timer call out 33 minutes. What was your average speed from mile 2 to mile 5?

(b) If you passed mile marker 5 at 33 minutes, what average speed do you need to run for the remainder of the race to meet your goal of completing the 26.2-mile marathon in 175 minutes? (Round your answer to two decimal places.)

6. Using the graph of f given below, determine a single numerical value for the constant a that makes the following inequality true (multiple values for a exist):

$$-1 < \frac{f(a+.5) - f(a)}{.5} < 0.$$



7. A toy car begins moving from rest. Let $s(t)$ represent the distance a toy car has moved away from its initial position (in feet) and let t represent the number of seconds elapsed since the toy car started moving. Values of $s(t)$ for various values of t are provided in the table below.

t	2.6	2.8	3	3.2	3.4	3.6
$s(t)$	36	41	47	52	56	61

(a) Approximate the speed of the toy car 3 seconds after it started moving.

(b) Approximate the acceleration of the toy car 3 seconds after it started moving.