

Homework 1

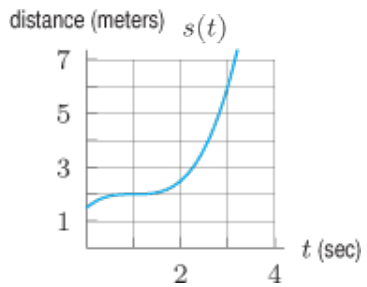
§2.1#1, 5*, 7*, 25, 29, **10, 18, 26**

§2.2#11, 19, 22, 32, 43, **12, 14, 45**

§2.1 #1. The distance, s , a car has traveled on a trip is shown in the table as a function of the time, t , since the trip started. Find the average velocity between $t = 2$ and $t = 5$.

t (hours)	0	1	2	3	4	5
s (km)	0	45	135	220	300	400

§2.1 #5*. A particle is moving right along the x -axis. The graph shows the particle's distance from the origin. What is the particle's average velocity from $t = 1$ to $t = 3$?



§2.1 #7*. At time t in seconds, a particle's position along the y -axis, $s(t)$, in cm is given by $s(t) = 4 + 3\sin(t)$. What is the average velocity of the particle from $t = \pi/3$ to $t = 7\pi/3$?

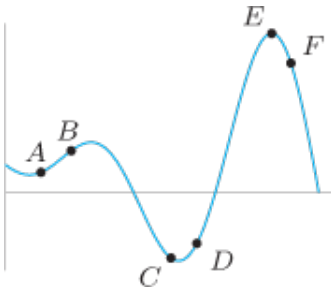
§2.1 #25. Evaluate the following limit: $\lim_{h \rightarrow 0} \frac{(2+h)^2 - 4}{h}$

§2.1 #29. Explain what is wrong with the statement “Velocity and speed are the same.”

§2.1 #10. In a time of t seconds, a particle moves a distance of s meters from its starting point where $s = \sin(2t)$.

- Find the average velocity between $t = 1$ and $t = 1 + h$ if $h = 0.1, 0.01, 0.001$.
- Use your answers to part a) to estimate the instantaneous velocity of the particle at time $t = 1$.

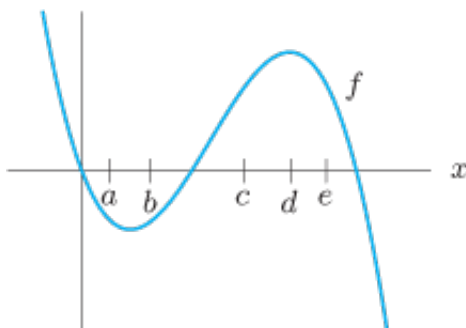
§2.1 #18. Match the points labeled on the curve in the figure below with the given slopes.



Slope	-3	-1	0	1/2	1	2
Point						

§2.1 #26. Use algebra to evaluate the following limit: $\lim_{h \rightarrow 0} \frac{(1+h)^3 - 1}{h}$.

§2.2 #11. The graph of f is given below. Match the derivatives in the table with the point a, b, c, d, e .

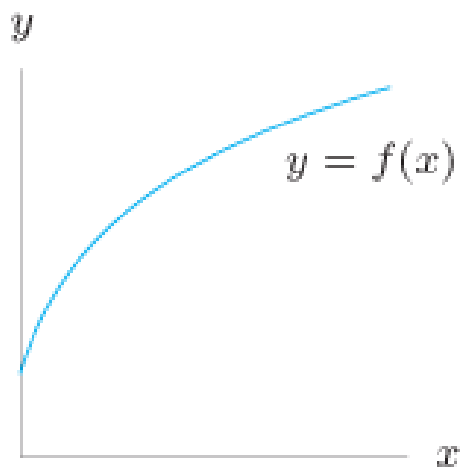


x	$f'(x)$
	0
	0.5
	2
	-0.5
	-2

§2.2 #19. On the graph, choose two positive values x and $x + h$ on the x -axis. Mark lengths on the graph that represent the following quantities:

a) $f(x)$ b) $f(x + h)$ c) $f(x + h) - f(x)$ d) h

e) Using your answers to parts a)–d), show how the quantity $\frac{f(x+h) - f(x)}{h}$ can be represented as the slope of a line on the graph.



§2.2 #22. a) If f is even and $f'(10) = 6$, what is $f'(-10)$?

b) If f is any even function and $f'(0)$ exists, what is $f'(0)$?

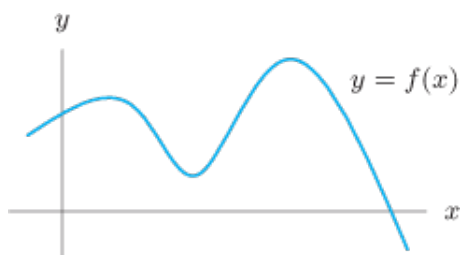
§2.2 #32. a) Graph $f(x) = \frac{1}{2}x^2$ and $g(x) = f(x) + 3$ on the same set of axes. What can you say about the slopes of the tangent lines to the two graphs at the point $x = 0$? $x = 2$? Any point $x = x_0$?

b) Explain why adding a constant value, C , to any function does not change the value of the slope of its graph at any point. [Hint: Let $g(x) = f(x) + C$, and calculate the difference quotients for f and g .]

§2.2 #43. Algebraically find the derivative of $g(t) = t^2 + t$ at $t = -1$. [“Algebraically” means “using the limit definition of the derivative”.]

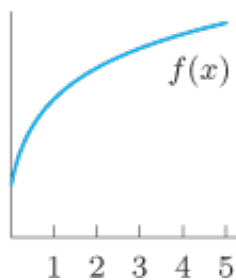
§2.2 #12. Label points A, B, C, D, E, and F on the graph $y = f(x)$ shown below.

- a) Point A is a point on the curve where the derivative is negative.
- b) Point B is a point on the curve where the value of the function is negative.
- c) Point C is a point on the curve where the derivative is largest.
- d) Point D is a point on the curve where the derivative is zero.
- e) Points E and F are different points on the curve where the derivative is about the same.

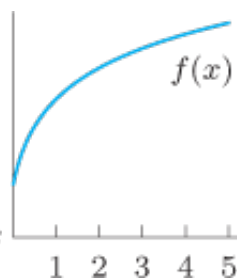


§2.2 #14. Show how to represent the following on the graph. (For each graph, sketch the answer to the letter above it.)

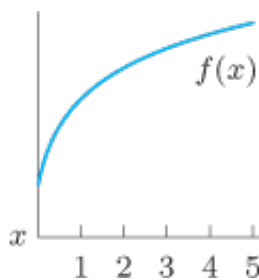
a) $f(4)$



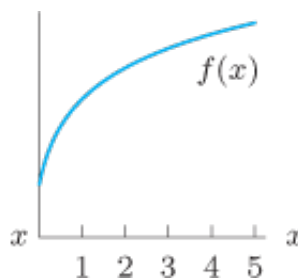
b) $f(4) - f(2)$



c) $\frac{f(5) - f(2)}{5 - 2}$



d) $f'(3)$



§2.2 #45. Find the derivative of $g(x) = \frac{1}{x}$ at $x = 2$ algebraically. [Again, “algebraically” means “using the limit definition of the derivative”.]