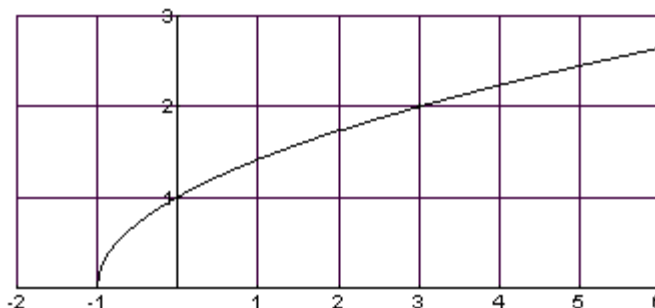


I. Computing Slopes

1. Consider the function $f(x) = \sqrt{1+x}$. The graph of this function is shown to the right.



- (a) Compute the *slopes* of the secant lines to f between the pairs of points with the following x -coordinates:

(i) $x = 3$ and $x = 4$	(ii) $x = 3$ and $x = 3.5$
(iii) $x = 3$ and $x = 3.1$	(iv) $x = 3$ and $x = 2$
(v) $x = 3$ and $x = 2.5$	(vi) $x = 3$ and $x = 2.9$

- (b) Using the slopes you have found so far, what is your guess for the slope of the tangent line to f at $x = 3$?
- (c) Write the equation of the tangent line to f at $x = 3$. Then graph the function and the line you just found on your calculator. The line should appear to be tangent to the curve at the point $(3, 2)$.

2. The number N of locations of a popular coffeehouse chain is given in the table. (The numbers of locations as of June 30 are given.)

Year	2003	2004	2005	2006	2007
N	7225	8569	10241	12440	15011

- (a) If P is the point $(2005, 10241)$, find the slopes of the secant lines PQ when Q is the point with $t = 2003, 2004, 2006, 2007$.
- (b) Estimate the slope of the tangent line at P by averaging the slopes of two secant lines. This slope represents the rate at which the number of coffeehouses is increasing in 2005.

II. The Velocity Problem

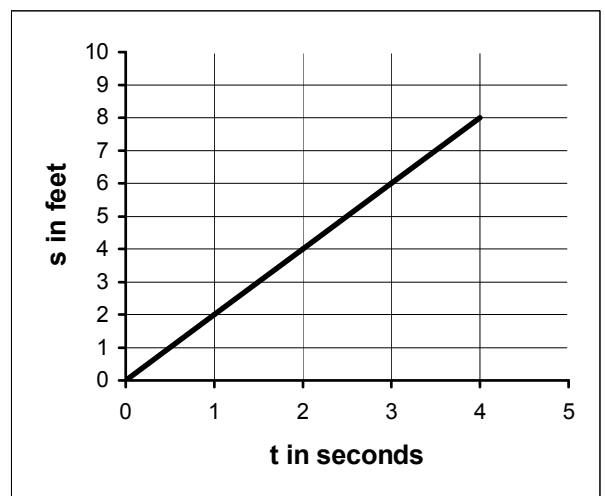
3. Suppose that an object is traveling horizontally along a straight line. Table 1 below gives the distance it has traveled at time t .

Table 1

time t (in seconds)	0	1	2	3	4
distance s (in feet)	0	2	4	6	8

- (a) Is this object traveling at the same velocity throughout the time period? How do you know?
- (b) What is the velocity of the object at any time t in the given time period?

- (c) The information given in the table is plotted below and connected with a line. What characteristic of the graph corresponds to the velocity of the object?

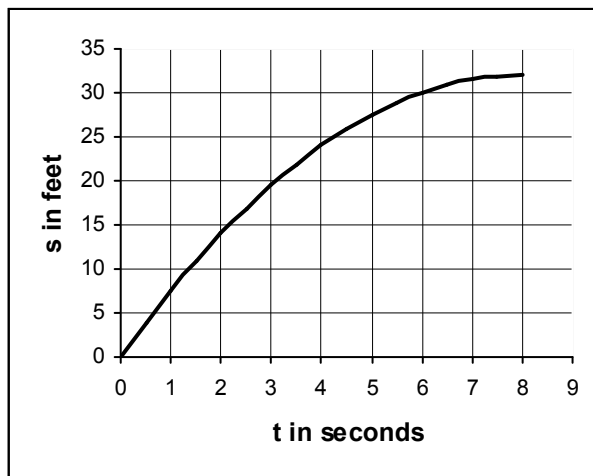


4. A second object is also traveling horizontally along a straight line. Table 2 below gives the distance it has traveled at time t .

Table 2

time t (in seconds)	0	1	2	3	4	5	6	7	8
distance s (in feet)	0	7.5	14	19.5	24	27.5	30	31.5	32

- (a) Is this object traveling at the same velocity throughout the time period? How do you know? If the velocity is not the same, is it increasing or decreasing?
- (b) The information given in the table is plotted below and connected with a curve.



- (c) Determine the average velocity of the object from $t = 3$ to $t = 4$.
- (d) How can you show this on the graph? Think about the connection between velocity and the graph in the previous example.
- (e) How could we use the graph to visualize the velocity of the object during the time interval $t = 3$ to $t = 3.5$? What about *at* $t = 3$?