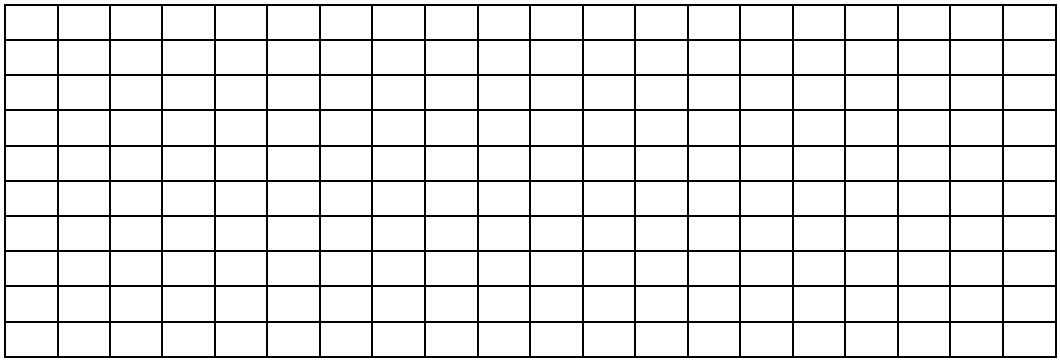
Accumulated (and Other) Change Problems

Problem 1

Suppose car A is moving with a steady velocity of 30 miles per hour for 24 minutes and then a steady velocity of 40 miles per hour for 36 minutes. Draw a graph of car A's velocity as a function of time.



Velocity is the rate of change of distance. Acceleration is the rate of change of velocity. What is car A's average acceleration? Provide a graphical interpretation.

How far has car A gone? Provide a graphical interpretation.

Problem 2

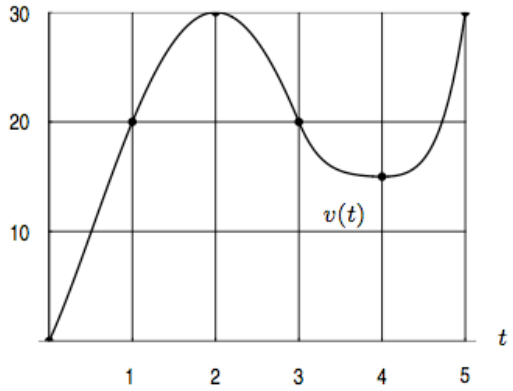
A sports car accelerates from 0 ft/sec to 88 ft/sec in 5 seconds (88 ft/sec = 60 mph). The car's velocity is given in the table below

t	0	1	2	3	4	5
$V(t)$	0	30	52	68	80	88

Find upper and lower bounds for the distance the car travels in 5 seconds.

In which time interval is the average acceleration greatest? Smallest?

Problem 3
The graph shown below is that of the velocity of an object (in meters/second).



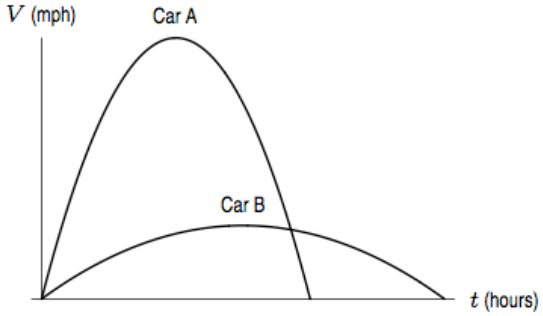
Find upper and lower estimates of the total distance traveled from $t = 0$ to $t = 5$ seconds. First, use 1 second intervals. Second, use 0.5 second intervals.

At what times is the acceleration zero?

Problem 4
Suppose the speed of car B is at t seconds is given by $v(t)=t^2$ feet per second. How far has car B gone after 12 seconds? What is car B's average acceleration? What is car B's maximum acceleration?

You might start by compiling a table of speeds from 0 to 12 seconds, let's say every 2 seconds…

Problem 5
Two cars start at the same time and travel in the same direction along a straight road. The figure below gives the velocity, v, of each car as a function of time, t.



Which car reached the larger maximum velocity?
Which car traveled for the longer time?
Which car traveled the greater distance?