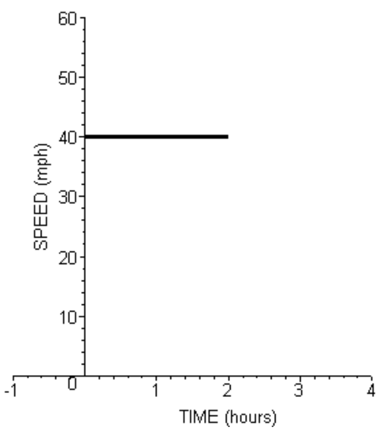
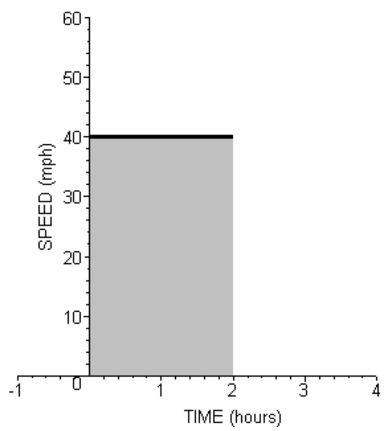
Worksheet on Areas (Due: tomorrow – beginning of class) Name:

1. Suppose you drive for 2 hours at a speed of 40 mph.
   a. Compute how far you traveled.

   b. Below is a sketch of your speed (mph) as a function of time (hours). If you shade the (rectangular) region between this curve and the x-axis, find the area of this shaded region.



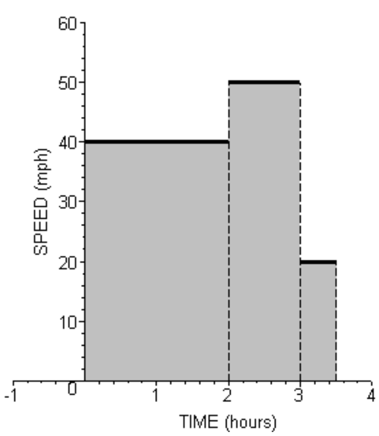


   c. How is the area of this shaded region related to the distance traveled?

2. Suppose you drive for 2 hours at a speed of 40 mph then instantly change to 50 mph and drive for 1 more hour. Then you instantly change to 20 mph and drive for half an hour.

   a. Compute how far you traveled.

   b. Below is a sketch of your speed (mph) as a function of time (hours). If you shade the (rectangular) region between this curve and the x-axis, find the area of this shaded region.

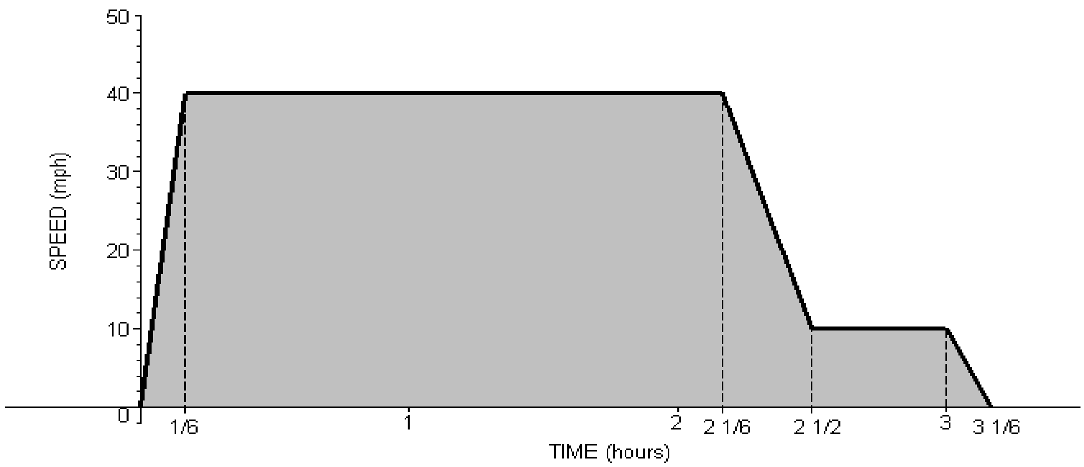


   c. How is the area of this shaded region related to the distance traveled?

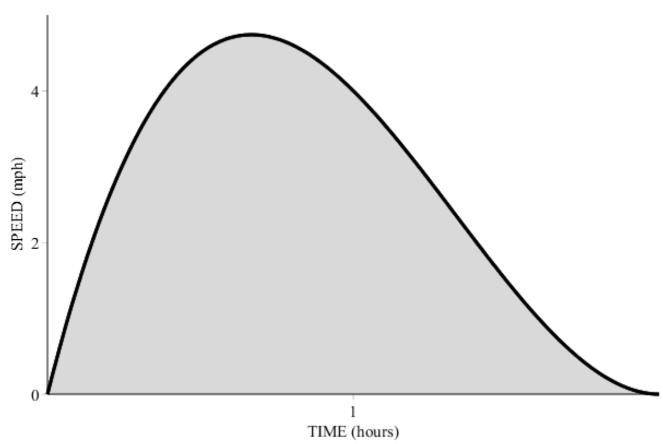
3. Suppose you start at 0 mph and steadily increase your speed for 10 minutes (1/6 hour) until you reach 40 mph. Then you drive for 2 hours at a speed of 40 mph. Then you take 20 minutes (1/3 hour) to steadily decrease to a speed of 10 mph and then you travel at that speed for 30 minutes. Finally, you take another 10 minutes (1/6 hour) to finally come to a stop.

   Based on your answers in the last two problems, what quantity in the graph below would give you the distance you traveled?

   Use the graph to find the total distance traveled.



4. Suppose you drive for 2 hours at a speed given by $v = f(t)$ given below. Based on your answers in the last three problems, what quantity (in words) in the graph below would give you the distance you traveled?



   But finding this area ***exactly*** is a problem since it has a curved top and it is *not* a nice geometric shape (rectangle, triangle, circle, etc.) with an area formula.

   As usual, if we don't know how to find the value ***exactly***, we start by finding an ___________________ using techniques we already now.

   For example, we will approximate the area of this shaded region using shapes that have areas which are easy to compute.