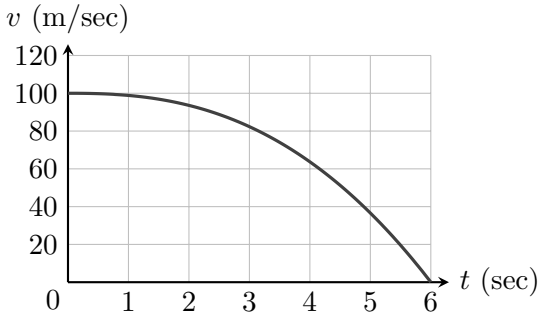
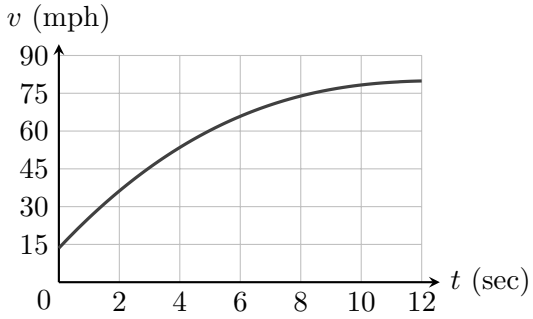
MATH 1450 **Name:** _____

Activity 12

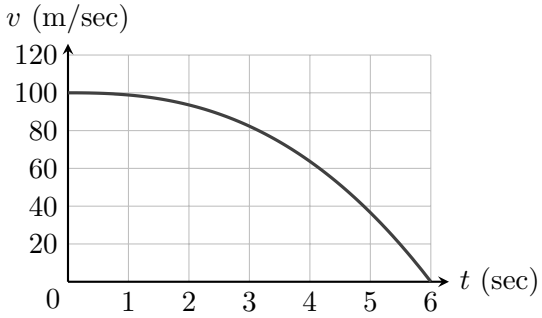
In lecture, we've been discussing about how the idea of the definite integral connects an object's velocity and distance traveled. This activity will give more practice working with definite integrals and some of their basic applications.

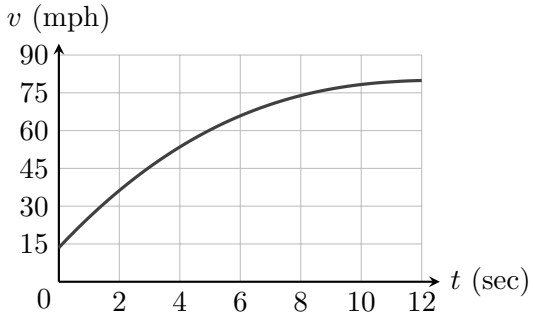
1. For each of the graphs shown below, draw the rectangles corresponding to the right-hand sum for the area under the velocity curve. Use the smallest width that makes sense. Then determine whether the estimate given by the right-hand sum will be an over- or under-estimate of the area.





2. For each of the graphs shown below, draw the rectangles corresponding to the left-hand sum for the area under the velocity curve. Use the smallest width that makes sense. Then determine whether the estimate given by the left-hand sum will be an over- or under-estimate of the area.





3. Let $f(x) = \sqrt{x+1}$. For each part below, estimate $\displaystyle\int_{-1}^{11} f(x)\,dx$ using the described method on the given interval. Round your answers to 3 decimal places.

(a) Use a right-hand sum with $n = 6$ subintervals

(b) Use a left-hand sum with $n = 4$ subintervals

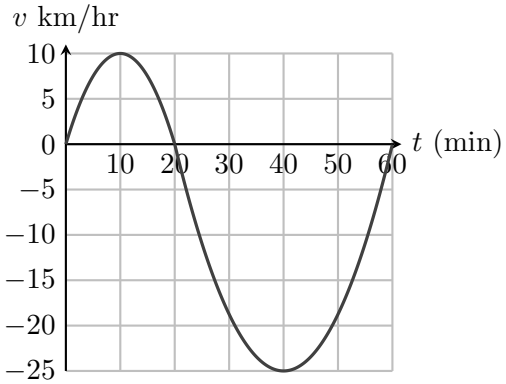
4. Oil is leaking out of a tanker damaged at sea. The damage to the tanker is getting worse as we can see the leakage L is increasing as time goes on in the table below. Suppose the leakage $L = f(t)$, where f is a continuous, increasing function on the interval $0 \leq t \leq 8$ and t is measured in hours.

Time t (hr)	0	2	3	5	8
Leakage L (gal/hr)	50	70	136	369	720

(a) Calculate a lower estimate for the total amount of oil that escapes during the 8 hours shown in the table.

(b) Calculate an upper estimate for the total amount of oil that escapes during the 8 hours shown in the table.

5. A bicyclist is pedaling along a straight road for one hour with velocity v as shown in the graph below. She starts out 5 km from the lake, and positive velocities take her towards the lake.



(a) Does the cyclist ever turn around? If so, at what time(s)?

(b) When is she going the fastest? How fast is she going at that point? Toward the lake or away?

(c) When is she closest to the lake? Approximately how far is she from the lake at that point?

(d) When is she furthest from the lake? Approximately how far is she from the lake at that point?

(e) What is the approximate total distance she traveled?