Name _____ Date _____ Class # _____ Block _____

Intro to Calculus
Homework 24

Goals

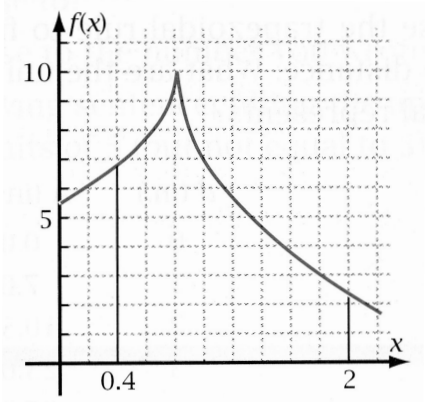
I can estimate the definite integral.

I can use estimates of the definite integral to solve problems.

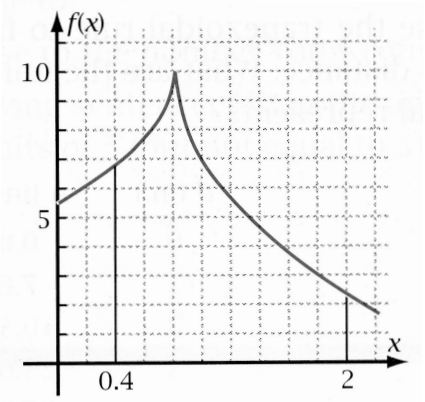
I can explain the meaning of the definite integral and give examples of when finding it would be useful.

1. Estimate the definite integral for the following using the specified method. Draw the rectangles on the graphs and show your calculations on this paper.

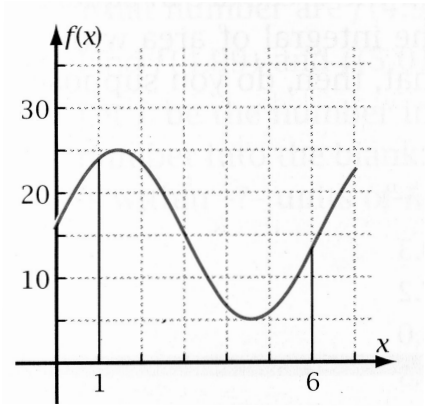
   a. 4 left hand rectangles

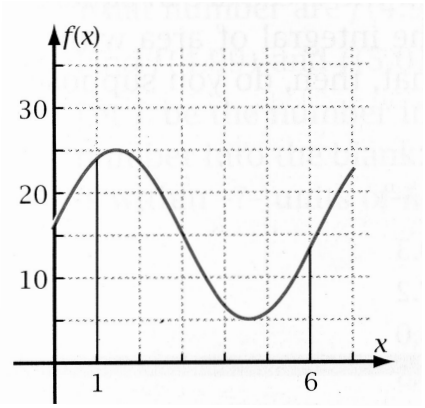
   b. 4 midpoint rectangles

   c. 5 right hand rectangles

   d. 5 trapezoids

2. A rocket is being launched from Cape Canaveral. As the last stage of the rocket motor is firing the velocity is given by the function

$$v(t) = 1600(1.1)^t$$

   where $v(t)$ is in feet per second and t is the number of seconds since the last stage started.

   a. Use you calculator to graph $v(t)$ for $t = [0,30]$.

Name _____ Date _____ Class # _____ Block _____

b. Using the trace function on your calculator, find the values of $v(t)$ every 5 seconds over the interval $t=[0,30]$. Round to the nearest tenth. Record this data in a table on your paper.

c. Using your data table to help, make an accurate sketch of the graph of $v(t)$.

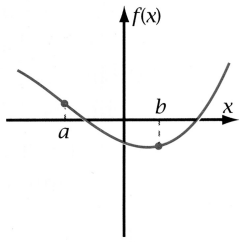
d. Find, approximately, the definite integral over the interval $t=[0,30]$ by using trapezoids of width corresponding to 5 seconds. Sketch these trapezoids on your graph. Show the calculations of the areas of the trapezoids.

e. What units should be used for the definite integral in this situation? Why? What does the definite integral in this situation represent?

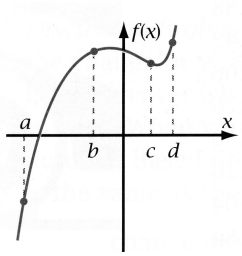
f. To go into orbit around the earth, the rocket must be going at least 27,000 feet per second. What will be the approximate time when it reaches this velocity?

3. Graphs of functions with values of x marked a, b, c… are shown below. At each marked value, tell whether the function is increasing or decreasing, or neither as x increases, and tell whether the rate of increase or decrease is fast or slow.

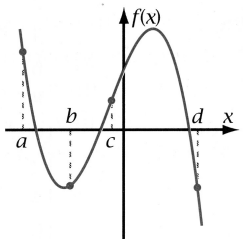
a.



b.



c.



4. For each of the following:

i) Find $f(c)$

ii) Determine whether $f(x)$ is increasing or decreasing at $x=c$

iii) Approximate the rate of change at $x=c$.

a. $f(x)=-x^2+8x+5,\ c=1$ b. $f(x)=3^x,\ c=2$ c. $f(x)=-\frac{1}{x},\ c=-2$

5. You have learned two of the main concepts of Calculus: the derivative at a point and the definite integral. In your own words, explain what each of these concepts mean (words≥50).

6. Give an example of an applied (“real life”) problem whose solution would involve finding the derivative at a point.

7. Give an example of an applied (“real life”) problem whose solution would involve finding the definite integral.