

MAT 202
Assignment 1
Thursday, July 10, 2013

For full credit on these problems, each must be submitted with a complete and clear solution, showing all of your work. You may work with other classmates on these problems, but please indicate on your assignment if you received help. Partial answers and incomplete solutions may be eligible for some partial credit, depending on the level of completeness and demonstrated understanding.

1. Find the following indefinite integrals

(a) $\int x^2 + 7x + 3 \, dx$

(b) $\int \cos 2t + 2 \sin t + e^{3t} + 3^t \, dt$

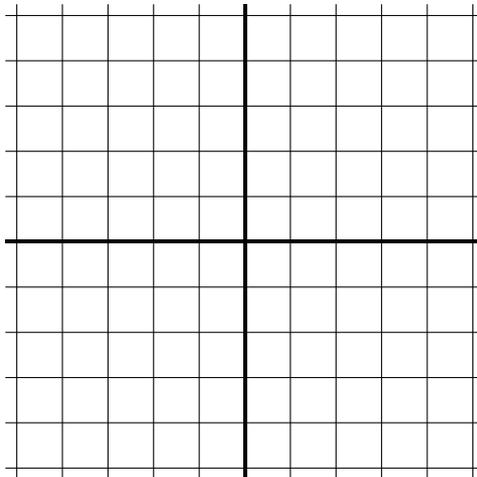
2. The empire state building is 450 meters tall at the tip. A rock is dropped from the tip.

(a) Express the height of the rock as a function of the time t in seconds.

(b) How long will it take for the rock to hit the ground?

(c) What is the speed of the rock when it hits the ground?

3. Use the graph of $f'(x)$ below to answer the following questions, given that $f(-1) = 1$.



(a) Approximate the slope of f at $x = 2$.

(b) Is it possible that $f(2) = 4$?

(c) Which is larger, $f(-3)$ or $f(-2)$?

(d) Sketch an approximate graph of f .

4. Use the summation formulas on page 296 of the text to find a formula for

$$\sum_{i=1}^n i^3 + i^2 - i + 2.$$

5. Consider the function $f(x) = 7 - x^2$ on the interval $[0, 2]$.
- (a) Find $s(1)$, the lower sum for 1 rectangle.
 - (b) Find $s(2)$, the lower sum for 2 rectangles.
 - (c) Find $s(n)$, the lower sum for n rectangles.
 - (d) Find $\lim_{n \rightarrow \infty} s(n)$.
 - (e) Find $S(1)$, the upper sum for 1 rectangle.
 - (f) Find $S(2)$, the upper sum for 2 rectangles.
 - (g) Find $S(n)$, the upper sum for n rectangles.
 - (h) Find $\lim_{n \rightarrow \infty} S(n)$.
 - (i) Compare your answers in parts (d) and (h). Explain why this allows us to take any arbitrary x_i in the i th subinterval in our definition of the area of a region.
6. Consider a function $f(x)$ that is decreasing on the interval $[1, 5]$. The interval is subdivided into 8 subintervals.
- (a) What are the left endpoints of the first and last subintervals?
 - (b) What are the right endpoints of the first and last subintervals?
 - (c) When using the right endpoints, will the rectangles lie above or below the graph of $f(x)$? Use a graph to explain your answer.