

Fall 2004 Calculus I, sections 4, 5, 6, Courant Institute of Mathematical Sciences, NYU.

Homework 5, due October 11

Self check (not to hand in, answers are in the back of the book):

Section 3.7: 1, 5, 9, 15, 23, 29.

Section 3.8: 3, 9.

Section 3.9: 3, 9.

To hand in:

Section 3.7: 2, 4, 8, 10, 20, 26, 30, 44, 58.

Section 3.8: 2, 6, 18, 22, 32.

Section 3.9: 4, 10, 18.

More problems (to hand in) Define $f(x) = \sqrt{x + \frac{1}{2}}$.

1. Find the coefficients a , b , so that $l(x) = a + bx$ has the same value and derivative as f when $x = 0$.
2. Find the coefficients a , b , and c , so that $q(x) = a + bx + cx^2$ has the same value, first derivative, and second derivative as f when $x = 0$. Have the coefficients a and b changed from problem 1?
3. Make a carefully drawn graph showing the values of f , l , and q , for the x values .1, .2, .3, .5, .7, 1. Make the x and y scales the same. Make the distance between $x = 0$ and $x = 1$ at least five inches. Draw the graph of $l(x)$ with a ruler and sketch the other curves carefully.
4. From the graph in problem 3, how accurate are the linear and quadratic approximations to f , and over what range of x values are these approximations valid?
5. Comment on the sizes of the numbers $f(x) - f(0)$, $f(x) - l(x)$, and $f(x) - q(x)$. Which are smaller for small x ?