Newberger, Math 122, Fall 2005

Homework: Sections 2.5, 2.6 and 2.7

Due: Tuesday, September 20

I. Do Section 2.5 #4. For each point at which f is not continuous, say how f fails to be continuous by explaining which one (or more) of the properties listed on page 124 below Definition 1 fails to hold. Do not call the properties on that list by their numbers only; write out the statements.

II. Sketch the graph of a function g having the following properties:
   i. $\lim_{x\to 5} g(x)$ does not exist.
   ii. $g(3)$ does not exist.
   iii. $\lim_{x\to 1} g(x)$ exists, but $\lim_{x\to 1} g(x) \neq g(1)$.

III. Do Section 2.5 #16 and #18.

IV. Do Section 2.6 #8. Draw your graph large enough to read.

V. Find the horizontal and vertical asymptotes of the following function. Show your work.

$$f(x) = \frac{x^2 + 3x + 2}{5x^2 - 5}$$

Tip: To find the horizontal asymptotes, calculate $\lim_{x\to +\infty} f(x)$ and $\lim_{x\to -\infty} f(x)$ and see if you get a finite number as your answer. If you get a finite number L for one of your limits, then a horizontal asymptote is $y = L$. Note that horizontal asymptotes should be expressed as lines $y =$ something.

To find the vertical asymptotes, find the values $x = a$ at which the function is undefined (i.e. at which the denominator is zero), and calculate $\lim_{x\to a^+} f(x)$ and $\lim_{x\to a^-} f(x)$. If you get infinity in either limit, then $x = a$ is a vertical asymptote. Note that vertical asymptotes should be expressed as lines $x =$ something.

VI. Do Section 2.7 #20.