Math 331.1   Problem Set 2   Fall 2005

Due: Friday, Sept. 23, start of class

1. Do page 63, Exercise 2.

2. Do page 64, Exercise 12.

3. For the initial value problem equation $y' = y^{2/3}$, $y(0) = 0$:

   (a) Verify that $y_1(t) = 0$ is a solution.

   (b) Verify that $y_2(t) = \frac{1}{27} t^3$ is also a solution.

   (c) Why doesn't this situation contradict the Uniqueness Theorem?

   (d) What does HPGSolver (from DETools) do with this problem?

4. Do page 74, Exercise 12.

5. (a) Do page 91, Exercise 4.

   (b) Do page 92, Exercise 16. You should make a sketch with paper and pencil here that is qualitatively correct and based upon the nature of the equilibrium points. Thus, you could determine for each of the solutions $y(t)$ at issue what the values of $\lim_{t \to \infty} y(t)$ and $\lim_{t \to -\infty} y(t)$ are—and include some words of justification . (Of course, you may check your sketch against what your calculator or some ODE graphing applet shows.)

6. Do page 92, Exercise 30. Note that the graph shown for $f(y)$ is tangent to the horizontal axis at the rightmost bend.