Math 444/544 **Fall 2010**
Homework 5, due Friday 15 October.

1. (10 points)

   444 students: Decide what topic you want to work on for your final project. Write a project proposal of a couple of paragraphs on your user page.

   544 students: Look at the exercise and quiz templates on my user page. Make a simple example and simple quiz on your user page to demonstrate that you can use these templates. Note: the quiz template works on Wikiversity, but not on Wikipedia; you also cannot test the quiz on a preview page.

   Print and submit (that portion of) your user page.

2. (30 points) Do this problem as a Good Problem, paying attention to the *Symbols* handout.

   Determine the coefficients a, b, c, and d such that the formula

$$\int_{-1}^{1} f(x)dx = af(-1) + bf(1) + cf'(-1) + df'(1)$$

   is exact for all polynomials of degree 3 or less.

3. (30 points) To numerically solve an initial value ODE $y'(t) = f(t, y(t))$, the following method is proposed:

$$y_{n+1} = y_n + \frac{h}{4}\left[f(t_n, y_n) + 3f\left(t_n + \frac{2}{3}h, y_n + \frac{2}{3}hf(t_n, y_n)\right)\right].$$

   Determine (and prove) the order of this method.

4. (30 points) Read lectures 30 and 31 in the MATH 344 notes, and look at the programs `myeuler` and `mymodeuler`. Do exercise 30.1 and 31.1.