CS 322: Quiz 1

Friday, June 28, 2002

The rules for this quiz are as follows:

- **Write your name, student ID number, and e-mail address in the upper-right hand corner of the quiz.**
- This quiz will last for 15 minutes.
- Show **ALL** work for partial/full credit. This includes any definitions, mathematics, figures, etc.
- Write your solution in the space labeled **WORK** below. If you need more room, you may write **OVER** on the page and then continue your solution on the back. Write your answer in the space labeled **ANSWER** below.
- No collaboration of any kind is allowed on the quiz.
- The quiz is closed book and closed notes.
- No calculators are allowed on the quiz.

1. (10 points) You have decided to interpolate the function $f(x) = \exp(-3x)$ on $[0, 1]$. You know that you want to use a polynomial interpolant, $p_{n-1}(x)$, of degree $n-1$ (or less) with n equally-spaced data points. However, you haven't figured out what value to use for n. Your concern is that your interpolant do a good job of approximating the true function, $f(x)$, on $[0, 1]$. In particular, you want to be sure you have enough data points so that the maximum amount of error you could possibly have at any point is 0.1. Determine the minimum number of data points necessary so that the error in the interpolant, $p_{n-1}(x)$, is guaranteed to be at most 0.1. You might find the following result for polynomial interpolation with equally-spaced data points helpful:

$$|f(z) - p_{n-1}(z)| \leq \frac{M_n}{4n}\left(\frac{b-a}{n-1}\right)^n.$$

WORK:

ANSWER: