MTH 351 Fall 2006 – Lab 1

Due: Before class October 16

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1. Consider the following two Taylor's series:

$$\log(1-x) = -\sum_{k=1}^{\infty} \frac{x^k}{k} \tag{1}$$

$$\log\left(\frac{1+x}{1-x}\right) = 2\sum_{k=1}^{\infty} \frac{x^{2k-1}}{2k-1} \tag{2}$$

   (a) To get $\log(1.9)$, what value of x must be used in series (1)? Write a script in Matlab to demonstate how many terms are necessary to achieve ten digits of accuracy?

   (b) Do the same as (a) for series (2).

   (c) Which series is more efficient for computing $\log(1.9)$ and why?

2. $\frac{22}{7}$ approximates π to three decimal places. Write a script to find the "best" rational approximation to π using a three digit numerator. Considering that $\frac{22}{7}$ is three numbers to remember in order to get three accurate digits, is your approximation more efficient for memorization?

3. (a) Consider the function described in Problem 5e in Section 2.2 of the book. Write a script which will create a table of values (similar to Table 2.7) obtained by evaluating the function as it is written, and also using the reformulation designed to eliminate *loss-of-significance* errors. Choose x from 10^{-1} to 10^{-20} decreasing by 0.1. Comment on what is happening and why.

   (b) Do the same for the function described in Problem 6b.