MATH333: Tutorial 1 (11-2-00)

1 UNIX

There are several useful UNIX commands you should know:

1. ls, with comparing to $ls\ -l$:
2. $quota - v$:
3. cd, with comparing to $cd\,directory$:
4. $mkdir$:
5. $pico$:
6. $user - setup$:
7. $f77\ -o\,file\,file.f$:

There are several useful links in the web you can use as references. Here is one of them from the ITSC homepage:

$$http://www.ust.hk/itsc/unix/UNIXhelp1.3/Pages/index.html$$

2 FORTRAN

1. $if\,(a.eq.b)\,then\ ...\ endif$ (p.31) :
2. $do\ ...\ enddo$ (p.23) :
3. $read$ (p.39) :
4. $write$ (p.46) :
5. $function$ (p.29) :
6. $subroutine$ (p.43) :
7. end (p.25) :

One of the very useful notes for FORTRAN programming is the Elements Of Fortran. You can print it from my homepage:

$$http://www.math.ust.hk/\sim matim/tutorial.html$$

Here are two examples we have discussed:

1. Largest integer can be represented.
2. Machine epsilon, $\epsilon_{mach.}$.

3 Root-finding

You should know Bisection method, Secant method and Newton's method to solve a non-linear equation last semester when you learn MATH 231. Here is the idea of Newton's method: To solve $f(x) = 0$, we iterate

$$x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)}, i = 0, 1, 2, \cdots$$

with initial guess x_0.

4 Exercise

1. Write a simple Fortran code, should be finished in several lines, to demonstrate the result of adding the machine epsilon to 1.

2. The accumulated value of a savings accoount baesd on regular periodic payments can be determined from the *annuity due equation*,

$$A = \frac{100P}{i}\left[\left(1 + \frac{i}{100}\right)^n - 1\right].$$

   In this equation, A is the amount in the account, P is the amount regularly deposited, and i is the rate of interest per period for the n deposite periods.

   (a) An engineer would like to have a savings account valued at \$ 750,000 upon retirement in 20 years, i.e. 240 monthes, and can afford to put \$1500 per month toward this goal. Writing a Fortran code with *function* command to determine the minimal interest rate for n equals 240 monthes, i_{240}, at which this amount can be invested, assuming that the interest is compounded monthly.

   (b) Using the same value of A and P as in the previous part to solve i_n for $120 \leq n \leq 360$ by modifying the previous Fortran code.