I. Program layout-- execution part

```
PROGRAM    program-name

   IMPLICIT   NONE
   [specification part]

   [execution part]

Stop
end

   [subprogram part]
```

The execution part is control statements, subroutine calls, functions, and intrinsic functions

II. Details… radioactive decay program

- Multiplication…. Use the * symbol
- Division… Use the / symbol

```
nuclei=nuclei*(1.0d0-dt/tau)
```

- Boolean logic… not like an ordinary equation!

- Comparison to exact result… intrinsic function dexp

```
nexact=n0*dexp(-time/tau)
```

III. Details… chemical reaction program

$$\frac{dn_A}{dt} = -k_{AB} n_A n_B + k_C n_C$$

$$\frac{dn_B}{dt} = -k_{AB} n_A n_B + k_C n_C$$

$$\frac{dn_C}{dt} = k_{AB} n_A n_B - k_C n_C$$

- Must save prior concentrations to use on right-hand side!

```
nao=na
nbo=nb
nco=nc
```

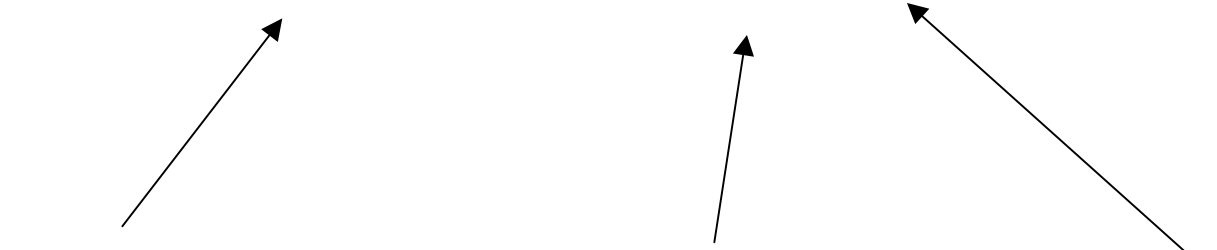
- Euler integration… you figure it out, but use nao,nbo,nco!

```
na=na+dt*( ??? )
nb=nb+dt*( ??? )
nc=nc+dt*( ??? )
```

IV. More details… output to screen, unit=6

```
write(6,100) time,na,nb,nc,ntota,ntotb

100    format(f8.4,5f12.6)
```



Line number

Float with 8 columns, 4 after decimal

5 float number with 12 columns each, 6 after decimal

V. More on editing

- In command mode, several commands to manipulate text

x	Delete character
dd	Delete entire line
yy	“Yank” a single line
y5	“Yank” 5 lines
p	“Place” yanked line(s)

- Recall from before the following commands, preceded by colon

:w	Write file to disk
:wq	Write file to disk, then quit
:q	Quit
:q!	Quit without saving changes (forces quit)

VI. Compiling and running your code

- After the code is written, compile it

```
ifort -o prog1 prog1.f
```

- Then run it, directing the data to a file “output.dat”

```
./prog1 > output.dat
```

- Now you can view the results, and then plot them

```
vi output.dat
```

VI. Plotting results with gnuplot

- Type gnuplot at command line to enter gnuplot
- At the gnuplot cursor, set the terminal to “dumb”

```
gnuplot> set terminal dumb
```

- Then plot your results, will come up on screen

```
gnuplot> plot ‘output.dat’
```

- Now make a .jpg file

```
gnuplot> set terminal jpeg
gnuplot> set output ‘decay.jpg’
gnuplot> plot ‘output.dat’
gnuplot> quit
```

VII. Getting the results to your machine

- For Mac OSX, linux operating systems, scp utility

  scp patrick@odin.engr.ucf.edu:decay.jpg decay.jpg

- For windows, need windows scp utility (much like putty)

  http://winscp.net/eng/index.php

  - Once installed and run, winscp will open a window to click and drag files between the odin machine and the windows machine

VIII. Decay results