Spring 2003 (Newton)   15.075 Applied Statistics

Homework # 1   assigned 5 February 2003, due 12 February 2003

Read Chapters 1 and 3 in the text. Then do the following problems. Please use a word processor to type up your solutions.

1. 3.2
2. 3.6
3. 3.8
4. 3.12
5. 3.16
6. 3.22
7. 3.26
8. An S-Plus exercise:

In S-Plus, open the commands window.

Type **?sample** to find out what the function sample does.
Type **?rnorm**, **?matrix** and **?apply** to find out what these functions do.

Type **fix(sample.fun)** to start editing a program called sample.fun.

Type the following inside the parentheses:
        (popsize = 1000, nsamp = 25, sampsize = 20)
These are the arguments to your function.

Type the following lines inside the brackets: (You don't really need to type in the comments which follow the #'s).

```
{
        # sample.fun - a function to draw random samples
        # popsize=population size (default=1000)
        # nsamp= number of samples (default=25)
        # sampsize = number in each sample (default=20)
        x <- rnorm(popsize)  # this is the population
        m <- matrix(NA, nsamp, sampsize)# matrix to put samples in
        for(i in 1:nsamp)
                    m[i, ] <- sample(x, sampsize) # put samples in rows of matrix
        print(apply(m, 1, mean))     # print sample means
        m       # return matrix of samples
}
```

From the menu, select **file, save and exit**.

If you now type **sample.fun,** you should see the lines of code displayed:

```
sample.fun
function(popsize = 1000, nsamp = 25, sampsize = 20)
{
# sample.fun - a function to draw random samples
# popsize=population size (default=1000)
# nsamp= number of samples (default=25)
# sampsize = number in each sample (default=20)
        x <- rnorm(popsize)    # this is the population
        m <- matrix(NA, nsamp, sampsize)   # matrix to put samples in
        for(i in 1:nsamp)
                m[i,  ] <- sample(x, sampsize)          # collect samples in rows
        print(apply(m, 1, mean))       # print sample means
        m       # return matrix of samples
}
```

To run your function type **x<-sample.fun().** (Putting the parentheses after the program name causes the program to run rather than just displaying the lines of code).

It will print out the sample means and store the matrix in an object called x.
You can print out x just by typing **x**.

Copy and paste your sample means to your homework solutions.
What kind of samples have you drawn? What is the sampling fraction here?