Quantitative Methods Boot Camp

Homework Exercises for Day 1

1. Make an array with the follow values by directly entering it and store it in **`x`**.

```
3 4 5
2 1 2
3 2 1
2 3 1
```

2. Do the following:
   a. Calculate the size of the array **`x`** from 1
   b. Use the **`size`** command to return the number of rows
   c. Use the **`size`** command to return the number of columns
   d. Use the **`length`** command to return the number of rows
   e. Use the **`length`** command to return the number of columns

3. For all these assume that for each letter the x array is as defined after question 1
   a. Retrieve the value from the 3rd row 2nd column of **`x`**.

   What will these do?

   b. **`x=[x;3]`**
   c. **`y=[x;1,2,3]`**
   d. **`x(:,4)=x(:,2);`**
   e. **`x.*(1./x)`**
   f. **`x+2*x`**
   g. **`x([4,2])=x(2,3)`**

   What will these return?

   a. **`x(3,5)`**
   b. **`x([2,3,1],[2,1])`**
   c. **`x(5)`**
   d. **`x(5+x(5))`**
   e. **`x([x(5), x(2,1)+1],mean([x(4,2),x(end)]))`**
   f. **`x(end,end)`**
   g. **`x(end)`**

   h. Make a new array y with two copies of x side by side.
   i. Make a new array y with two copies of x one on top of the other.

4. What do the following code snippets do?
   a. 1:10
   b. 1:3:10
   c. **`start=1`**
      `step=2`

```
stop=100
length(start:step:stop)
```

5. Start by typing

```
t=(1:100)*pi/25;
```

Now do the following:

a. Plot **`sin(t)`** on the y axis and t on the x axis.
b. Add to this plot (i.e. don't overwrite it) **`cos(t)`** on the y axis in red circles.
c. Now add **`tan(t)`** in green and make the **`LineWidth`** equal to 2.
d. Plot a green line going from the point (0,0) to the point (20,10) .

6. Consider the following code:

```
x=[];
for i=1:2:10
     x(i)=i;
end
```

a. How many times will the loop run?
b. What will **`x`** look like when the loop is done?

7. In the following code, what's the chance that A will equal 1? What is x going to look like?

a.

```
A=ceil(rand*100)
if mod(A,10)~=2
    A=1;
else
    A=2;
end
```

b.

```
x=[];
for i=1:10
    for j=1:10
        for k=1:10
            if i>j & j>k | (i==k & i==j)
                x(i,j,k)=1
            elseif mod(i+j+k,10)>9
                x(i,j,k)=2
            else
                x(i,j,k)=-1;
            end
        end
    end
end
```

8. Look up the help on the **`while`** loop. What does this program do? Think big picture.

```
a=round(rand*100)
p=0;
while (p==0)
    p=1;
    for x=2:a/2
        if mod(a,x)==0
            p=0;
        end
    end
    a=a+1;
end
a-1
```

9. In a single line of code, create **a**, a 10 by 10 array where all values are zero except along the diagonal where all values equal 5. (Hint: use the eye function (look this up with the MATLAB help)).

10. Starting with the **a** array you just created, and using a *single* line of code: to each element of the sixth row and eighth row of the array **a,** add double the value of the element in the sixth row, six column of array **a**.

11. Use the same array **a** from problems 9 and 10:
    a. Save a new array **b1** as the array **a** to the power of the value in the fourth row, fifth column of array **a**.
    b. Save a new array **b2** as each element of the array **a** to the power of the value in the fourth row, fifth column of array **a**.

12. Using the array from the last 3 problems:
    a. What is the average value of each column of array **a**? (Try using the built-in MATLAB function)
    b. What is the average value of each row of array **a**?
    c. What is the average value of every third column (1^{st} , 4^{th}, 7^{th}, etc.) of the array **a**?
    d. What is the average value of every other row (1^{st} , 3^{rd}, 5^{th}, etc.) of the array **a**?

Last updated 8/18/11 by JW.