CS1132 Lab Exercise 1

1   MATLAB fun . . . functions

Type each of the following expressions in the MATLAB *Command Window* (and press *Enter*) to see what it does.
Write the screen output (and answer the question) on each blank.

```
a= mod(7,2)   %_____ Function rem is similar; to see how they differ type the following

help mod      % quick function reference
help rem
doc rem       % detailed function documentation

b= (4*2) ...
+ 1           % What does  ...  do? _____ It's called the ellipsis
```

2   Different ways to create vectors

```
a= zeros(1,3)  %_____

b= ones(3,1)   %_____   What do the arguments specify?_____

c= rand(1,4)   %_____

d= 10:2:17     %_____

f= 10:-1:7     %_____

g= [10 20 40]  %_____   What does the space separator do?_____

h= [10,20,40]  %_____   What does the comma separator do?_____

k= [10;20;40]  %_____   What does the semi-colon separator do?_____

m= [a g]       %_____

n= [b; k]      %_____

p= [a k]       %ERROR--mismatched dimensions! (Attempt to concatenate a column to a row)

q= b'          %_____   This operation is called "transpose"

r= [a b']      %_____

s= sum(r)      %_____   What does function sum do?_____
```

3   Multiples of k

Complete the program so that it reads a positive integer k and outputs all the multiples of k up to 1000.

```
k = input('Enter a positive integer smaller than 1000:  ');

for j = _____
    fprintf('%d ', j);
end
fprintf('\n');
```

4 Roll multiple dice

Read the the function `rollDie` (see website) which simulates the rolling of one fair, six-sided die. Now write a function `rollDice(n,d)` to simulate the rolling of `d` six-sided dice `n` times. We define the *outcome* of rolling `d` dice once to be the sum of the faces that show up. In the function, create a vector `count` such that `count(c)` is the number of times that outcome `c` has occurred. Your function draws a histogram of the result. Below is an example histogram for small `n`. What shape do you expect to see for large `n`?
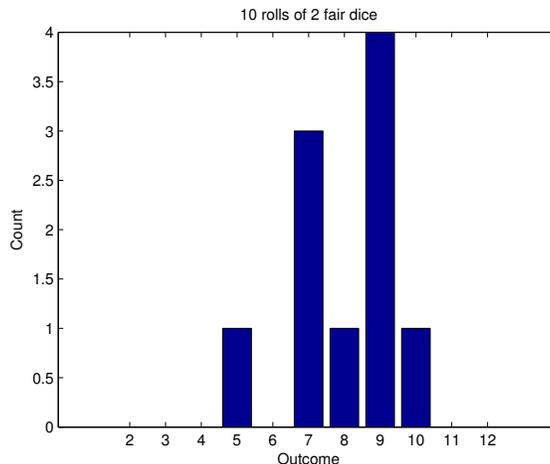
5 Examining a subarray

Write a function `vectorQuery(v,n,r)` to determine whether the number `r` appears in the first `n` components of vector `v`. The function returns 1 if `r` is in the first `n` components of `v` and 0 otherwise. Your function assumes that `v` is a vector of numbers, `n` is a positive integer, and `r` is a number. Use a loop to do the search and make sure that the loop index doesn't go "out of bounds" (if `n` is greater than the length of vector `v`).

6 Creating arrays of unknown length

Write a function `sequence(m)` that generates a sequence of random *integer* numbers between 1 and m, inclusive, stopping when a value is repeated for the first time. The function returns an array containing all the numbers generated (in the order in which they were generated) except for the last value that is a repeated occurrence.

Example: If the generated sequence is 3 1 9 5 7 2 5, the array to be returned should be 3 1 9 5 7 2.

Hints: 1) Use the function `vectorQuery` that you have developed already. 2) When you don't know how long a vector needs to be, you can build it one component at a time. Here is an example to store only the even integer values that a user enters:

```
% Prompt user to enter positive numbers and store the even integers in a vector v
k= 0;  % vector length so far
num= input('Enter a positive number: ');
while  num>0
    if  rem(num,2)==0
        k= k+1;
        v(k)= num;
    end
    num= input('Enter a positive number (negative to stop): ');
end
```

In a computer lab? Delete your files from the computer before you leave.