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.

\[
a = \text{mod}(7,2) \quad \% \text{______ Function rem is similar; to see how they differ type the following}
\]

help mod \quad \% \text{quick function reference}
help rem
doc rem \quad \% \text{detailed function documentation}

\[
b = (4*2) + 1 \quad \% \text{What does \ldots do? \________________________ It’s called the ellipsis}
\]

2 Different ways to create vectors

\[
a = \text{zeros}(1,3) \quad \% \____________
\]
\[
b = \text{ones}(3,1) \quad \% \____________ \text{What do the arguments specify? \__________________}
\]
\[
c = \text{rand}(1,4) \quad \% \____________
\]
\[
d = 10:2:17 \quad \% \____________
\]
\[
f = 10:-1:7 \quad \% \____________
\]
\[
g = [10 \ 20 \ 40] \quad \% \____________ \text{What does the space separator do? \__________________}
\]
\[
h = [10,20,40] \quad \% \____________ \text{What does the comma separator do? \__________________}
\]
\[
k = [10;20;40] \quad \% \____________ \text{What does the semi-colon separator do? \__________________}
\]
\[
m = [a \ g] \quad \% \____________
\]
\[
n = [b; k] \quad \% \____________
\]
\[
p = [a \ k] \quad \% \text{ERROR--mismatched dimensions! (Attempt to concatenate a column to a row)}
\]
\[
q = b' \quad \% \____________ \text{This operation is called "transpose"}
\]
\[
r = [a \ b'] \quad \% \____________
\]
\[
s = \text{sum}(r) \quad \% \____________ \text{What does function sum do? \__________________}
\]

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.

\[
k = \text{input}(\text{‘Enter a positive integer smaller than 1000: ’});
\]

\[
\text{for } j = \ __________________
\quad \text{fprintf(‘\%d’, j);
\text{end}
\quad \text{fprintf(‘\n’);
}
4 Roll multiple dice

Read the rollDie function (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.