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% Discussion Week #5
% fprintf, fscanf, functions()

clear;clc;close all;

% fprintf Command
fprintf('Good afternoon class. ');
fprintf('Good afternoon class.\n');
fprintf("Good afternnon class.\n"); % Is it an error to use " "?
% What does the semicolon suppress?

% Now lets display numbers and consider different "flags"
x = 1; y = 100; z = .01050;
fprintf('x = %i\n',x)
fprintf('y = %d\n',y)

% What about decimals? Differences?
fprintf('z = %i\n',z)
fprintf('z = %d\n',z)
fprintf('z = %f\n',z)
fprintf('z = %e\n',z)
fprintf('z = %g\n',z)

% How do we display to specific demical places, the precision of the flag?
fprintf('x = %5.0f\n',x) % extra spaces?
fprintf('y = %1.2f\n',y) % field width too small?
fprintf('z = %4.2f\n',z) % field width?
fprintf('z = %6.3f\n',z) % field width?
fprintf('z = %10.5f\n',z) % field width too long?

% Now play around with "precision" with different flags such as %e & %g

% fscanf Command
% I have a text file with 3 columns (time,x_pos,y_pos) with data from the
% cannon problem. I want to import the data into MatLab to manipulate.

fileID = fopen('CannonballData.txt','r'); % 'r' denotes reading from file
% % % 'w' denotes writing the the file opened (look into this as it is not
% % % as easy as it seems)
[A] = fscanf(fileID,'%f',[3,Inf]); % need 3 to denote the number of
% % % columns from my .txt file
fclose(fileID);
t = A(1,:); x = A(2,:); y = A(3,:);

Table = table(t,x,y,'VariableNames',{'Time_s','x_m','y_m'});
disp(Table);

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% function() Command
% Used to create functions that take an input and possibly produce an
% output. Typically used to program equation calculators inside MatLab

a = 1; b = 2; c = 3;
% Let's create a function called AddMult() that takes in 3 numbers, adds
% the first two numbers then multiplies that result by the third number.

[Result1] = AddMult(a,b,c); % Have to call the function first!
[~] = AddMult(a,c,b); % Results change? What does the ~ do?
[Result3] = AddMult(a,a,a); % This allowed?

% This must be at the end of your .m file OR in a separate file inside your
% directory
function R = AddMult(N1,N2,N3)
    R = N1 +N2;
    R = R*N3;
    fprintf('Result = %.1f\n',R);
end

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% Question
% Write a code that performs the following calculation using a loop:
%  $Y(x) = x^2$  ( $0 \leq x \leq 1$  by  $.1$ ). Display the results using fprintf in
% the following manner:  $Y(x) = x^2$ ,  $y(\text{current value of } x) = \text{result to}$ 
% 3 decimal places. Do this problem using both a for loop
% then a while loop.
% Hint: use fprintf command inside the loop

% clear;clc;close all

% Using a for loop
x = 0:.1:1;
N = numel(x); % total number of elements
Y = zeros(N,1); % pre-allocate

for i = 1:N
    Y(i) = x(i)^2;
    fprintf('Y(x) = x^2, y(%3.1f) = %5.3f\n',x(i),Y(i))
end

% Using a while loop
x = 0:.1:1;
N = numel(x); % total number of elements
Y = zeros(N,1); % pre-allocate
Count = 1; % initializing a counter

while (Count <= N)
    Y(Count) = x(Count)^2;
    fprintf('Y(x) = x^2, y(%1f) = %.3f\n',x(Count),Y(Count))
    Count = Count +1; % Why do I increase my count at this specific line?
    % Should I begin to increase my counter before my calculations and or
    % before my fprintf command?

    if (Count > 10000) % This essentially is an arbitrarily set safety
        % that stops the code if somehow I do over 10000 calculations.
        % Pretty much stops my while loop for forever continuing if I
        % somehow programed it wrong.
        break
    else % Is this else and continue necessary?
        continue
    end
end

% Can I do the while loop differently?
% Necessary to store all the numbers?

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