% Clair Cunningham PSWC01 WK10 In-Class Exercises

%% In-Class Exercise #1

% Print value of pi in different formats using fprintf

clc; close all; clear all;

fprintf('Floating point format: %f\n',pi);

fprintf('Floating point format: %6.2f\n',pi);

fprintf('Floating point format: %0.16f\n',pi);

fprintf('Floating point format: %8.16f\n',pi);

fprintf('Floating point format: %i\n',pi);

fprintf('Floating point format: %i\n',7);

fprintf('Floating point format: %12.4e.\n',10\*pi);

fprintf('Floating point format: %12.4e.\n',-100\*pi);

%% In-Class Exercise #2

% Repeat ICE#9 from last week, but use fprintf for output

%Evaluate the ratio A/B where A and B are double sums

clc;clear all; close all;

%Obtain the number of iterations;

n = input('Please enter the number of iterations ');

%Initialize variables

A = 0;

B = 0;

%For a Double loop to calculate sum A

for j = 1:n

for i = 1:j

A = A + i\*j^2;

end

%Calculates sum B using only the first for loop

B = B + j^3 + j^4;

end

ratioAB = A/B;

%formatted output

fprintf('For n=%i, the results are: A=%i and B=%i.\nThe ratio A/B=%0.4f.\n',n,A,B, ratioAB);

% The ratio comes out to always be 0.5 despite any change in the sums.

%% In-Class Exercise #3

% Create two arrays a&b containing integers from 1 to 20

% Find the integer numbers where pythagoreans thereom is satisfied.

clc; close all; clear all;

%Initialize Variables

a = [1:20];

b = [1:20];

num = 1;

count = 0;

for ai = 1:20

for bj = 1:20

c(num) = sqrt(a(ai)^2+b(bj)^2);

if c(num)==fix(c(num))

count = count+1;

intabc(1,count) = a(ai)^2;

intabc(2,count) = b(bj)^2;

intabc(3,count) = c(num)^2;

end

num = num +1;

end

end

num = num - 1;

fprintf('Output table for a^2 + b^2 = c^2\n');

fprintf('================================\n');

fprintf(' a^2 b^2 c^2\n');

fprintf('--------------------------------\n');

fprintf('%6i %10i %10i\n',intabc);

fprintf('================================\n');

%% In-Class Exercise #4

%Repeat the matrix of #3, but write to a file

% Create two arrays a&b containing integers from 1 to 20

% Find the integer numbers where pythagoreans thereom is satisfied.

clc; close all; clear all;

%Initialize Variables

a = [1:20];

b = [1:20];

num = 1;

count = 0;

for ai = 1:20

for bj = 1:20

c(num) = sqrt(a(ai)^2+b(bj)^2);

if c(num)==fix(c(num))

count = count+1;

intabc(1,count) = a(ai)^2;

intabc(2,count) = b(bj)^2;

intabc(3,count) = c(num)^2;

end

num = num +1;

end

end

num = num - 1;

fid = fopen('Cunningham\_PSWC01\_Wk10\_ICE10.xls','w');

% use fprintf to write into file

fprintf(fid,'Output table for a^2 + b^2 = c^2\n');

fprintf(fid,'===================================\n');

fprintf(fid,'a^2 \tb^2 \tc^2\n');

fprintf(fid,'-----------------------------------\n');

fprintf(fid,'%6i \t%10i \t%10i\n',intabc);

fprintf(fid,'===================================\n');

% close file

fclose(fid);

%% In-Class Exercise #5

% See PSWCStats.m function

%% In-Class Exericse #6

% Define anonymous function "parabola" and plot function using fplot

% Define function

clear all; close all; clc

%initialize variables

a = 2; b = 1; c = -2;

parabola = @(x) a\*x.^2 + b\*x + c;

% plot function

fplot(parabola,[-10 10]);

title('Function plot of parabola(x)');

grid on

%% In-Class Exercise #7

% Numerical Integration of (sin x)^2

clc; clear all ; close all;

%initialize variables

a = 0; b = pi;

n = 6;

h = (b-a)/n;

x = linspace(0,pi,n+1);

y = sin(x).^2;

%calculate integral

A = (h/2) \* (2\*sum(y)-y(1)-y(n));

%calculate percent error

I = pi/2;

pcterr = (A-I)/I\*100;

%output

fprintf('Numerical integration result =%10.6f, percent error =%8.4f%%\n',A,pcterr)

% use trapz function

A2 = trapz(x,y);

fprintf('Matlab trapz(x,y) result =%10.6f\n', A2);

function [myavg,mystdev] = PSWCStats(x)

%PSWCStats Custom function for In-Class Exercise #5

% returns both the mean & std dev of an array

myavg = mean(x);

mystdev = std(x);

end