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**EECS 360**

**Introduction to MATLAB**

**Lab Report #2**

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Objective:

The purpose of this lab was to demonstrate the capabilities of using Matlab functions and Matlab scripts.

Description:

Matlab scripts (.m files) allow a series of command line operations to be saved to be called and executed in series at a later time. Matlab functions are code objects that can perform a specific task, or set of tasks usually intended to be called multiple times. Placing code that must be run many times into a function.

An example matlab function is below. While the function could be replaced with a loop, a function saved as a matlab script can be loaded and called at a later time simply by typing “return = function(arg1,arg2);” into the console.

function AP = Calculate\_AP(a,s)

%arguments: 1 int and a row vector a,[s]

%returns: 2xn array [Area of shape:n; Perimeter of shape:n]

AP = zeros(2,size(s,2));

if a == 1 %Circle

for i = 1:size(s,2)

AP(1,i) = (2\*pi\*s(i));%Area Calculation

AP(2,i) = (pi\*s(i)^2);%Perimeter Calculation

end

elseif a == 2 %Triangle

for i = 1:size(s,2)

AP(1,i) = (0.5\*s(i)\*s(i));%Area Calculation

AP(2,i) = s(i)\*3;%Perimeter Calculation

end

elseif a == 3 %Pentagon

for i = 1:size(s,2)

AP(1,i) = 0.25\*(5\*(5+2\*(5^(1/2))))\*(s(i)^2);%Area Calculation

AP(2,i) = s(i)\*5;%Perimeter Calculation

end

elseif a == 4 %Hexagon

for i = 1:size(s,2)

AP(1,i) = ((3\*(3^(1/3)))/2)\*(s(i)^2);%Area Calculation

AP(2,i) = s(i)\*6;%Perimeter Calculation

end

else

disp('\n\nERROR: Shape Selection Not Valid. Ya done goofed son...\n')

AP=0;

end

end

Results:

Calculate\_AP.m script

function AP = Calculate\_AP(a,s)

%arguments: 1 int and a row vector a,[s]

%returns: 2xn array [Area of shape:n; Perimeter of shape:n]

AP = zeros(2,size(s,2));

if a == 1 %Circle

for i = 1:size(s,2)

AP(1,i) = (2\*pi\*s(i));%Area Calculation

AP(2,i) = (pi\*s(i)^2);%Perimeter Calculation

end

elseif a == 2 %Triangle

for i = 1:size(s,2)

AP(1,i) = (0.5\*s(i)\*s(i));%Area Calculation

AP(2,i) = s(i)\*3;%Perimeter Calculation

end

elseif a == 3 %Pentagon

for i = 1:size(s,2)

AP(1,i) = 0.25\*(5\*(5+2\*(5^(1/2))))\*(s(i)^2);%Area Calculation

AP(2,i) = s(i)\*5;%Perimeter Calculation

end

elseif a == 4 %Hexagon

for i = 1:size(s,2)

AP(1,i) = ((3\*(3^(1/3)))/2)\*(s(i)^2);%Area Calculation

AP(2,i) = s(i)\*6;%Perimeter Calculation

end

else

disp('\n\nERROR: Shape Selection Not Valid. Ya done goofed man...\n')

AP=0;

end

end

Calculate\_volume.m script

function V = Calculate\_volume(a,s)

%arguments: 1 int and a row vector a,[s]

%Expects (integer, [radius/edge length, radius])

%returns: 2xn array [Volume of shape]

V = zeros(1,size(s,2));

if a == 1 %Sphere

V(1,1) = ((4/3)\*pi\*(s(1)^3));%Volume Calculation

elseif a == 2 %Cylinder

V(1,1) = (pi\*s(2)^2\*s(1));%Volume Calculation. Expects [height, radius]

elseif a == 3 %Right Cone

V(1,1) = (pi\*(s(2)^2)\*(s(1)/3));%Volume Calculation. Expects [height, radius]

elseif a == 4 %Cube

V(1,1) = (s(1)^3);%Volume Calculation

else

disp('\n\nERROR: Shape Selection Not Valid. Ya done goofed man...\n')

V=0;

end

end

lab2plot.m script

clear,clc

figure

subplot(2,2,1)

cylinder

title('Cylinder')

subplot(2,2,2)

sphere

title('Sphere')

subplot(2,2,3)

ellipsoid(0,0,0,5.9,3.25,3.25,30)

title('Ellipsoid')

subplot(2,2,4)

worldmap('antarctica')

antarctica = shaperead('landareas', 'UseGeoCoords', true,...

'Selector',{@(name) strcmp(name,'Antarctica'), 'Name'});

patchm(antarctica.Lat, antarctica.Lon, [0.5 1 0.5])

title('Antarctica')

Conclusion:

In conclusion, matlab can utilize functions and scripts together to add custom functionality. In the case of the Lab,