%Clair Cunningham PSWC-01 Week8 In-Class Exercises

%% In-Class Exercise #1

% Inputs radius

% Calculates the volume and surface area of a sphere

%Input

r = input('Enter some radii for a sphere : r, in ft = ');

%Calculate Volume

vol = 4/3\*pi.\*r.^3;

%Calculate surface area

s\_area = 4\*pi.\*r.^2;

%Output Results

msg = ['Volume of sphere is ' num2str(vol) ', and the surface area is ' num2str(s\_area)];

disp(msg)

%% In-Class Exercise #2

% Creates an array of x with corresponding y values

% Plots the resulting arrays

close all; clear all; clc

x = [0:0.5:10];

y = x.^3;

figure(1);

hold on;

plot(x,y);

xlabel('X', 'FontSize', 20, 'FontName', 'Arial');

ylabel('Y', 'FontSize', 20, 'FontName', 'Arial');

title('X vs. Y', 'FontSize', 28, 'FontName', 'Arial');

hold off;

%% In-Class Exercise #3

% Plots two x vs y plots on the same figure

clc; clear all; close all

X=0:2\*pi/40:2\*pi;

Y=sin(X);

plot(X,Y,'ro')

hold on

Y=cos(X);

plot(X,Y,'b+')

legend('sin','cos')

xlabel('X'); ylabel('Y');

title('sin(x) and cos(x) on one graph')

grid on

%% In-Class Exercise #4

% Plots two vertical (y) axes

close all; clear all; clc

x = [0:0.01:20];

y1 = 200\*exp(-0.05\*x).\*sin(x);

y2 = 0.8\*exp(-0.5\*x).\*sin(10\*x);

[AX,H1,H2] = plotyy(x,y1,x,y2);

legend('Low Frequency','High frequency')

xlabel('X');

grid on

set(get(AX(1),'Ylabel'),'String','Y')

set(get(AX(2),'Ylabel'),'String','Y','Rotation',270)

%% In-Class Exercise #5

% Creates Multiple Plots

close all; clear all; clc

year=[2007:2011]; %note: increment defaults to 1 if omitted

pop=[0.9 1.4 1.7 1.3 1.8];

subplot(2,2,1);

bar(year,pop);

title('bar'); xlabel('Year'); ylabel('Population')

subplot(2,2,2);

barh(year,pop);

title('barh'); xlabel('Year'); ylabel('Population')

subplot(2,2,3);

area(year,pop);

title('area'); xlabel('Year'); ylabel('Population')

subplot(2,2,4);

plot(year,pop,'-rs','MarkerSize',10);

title('line'); xlabel('Year'); ylabel('Population'); grid on

%% In-Class Exercise #6

% Create multi-pane plot

close all; clear all; clc

%Calcs for plot 1

t= [0:0.5:6.5];

x = cos(t).^3; y = sin(t).^3;

%Calcs for plot 2

theta = [0:pi/30:2\*pi];

r2 = 2 + cos(theta);

%Calcs for plot 3

r3 = 4.\*cos(theta)-1./cos(theta);

%Calcs for plot 4

r4 = exp(theta);

%Plot 1

subplot(2,2,1);

plot(x,y);

xlabel('x(t)'); ylabel('y(t)');

set(get(gca,'YLabel'),'Rotation',0.0);

title('Plot 1');

%Plot 2

subplot(2,2,2);

polar(theta,r2);

title('Plot 2');

%Plot 3

subplot(2,2,3);

polar(theta,r3);

title('Plot 3');

%Plot 4

subplot(2,2,4);

polar(theta,r4);

title('Plot 4');

%% In-Class Exercise #7

% Show the infinite series converges to the value shown

% Inputs the number of times to run the sum

close all; clear all; clc

for t = 1:3

n = input('Please input the number of terms you would to sum : ');

% Splits the total number into an array with spacing 1 between numbers

k = [0:1:n];

% Finds the individual summation of each element in the array

Summ = (-1).^k\*1./(2.\*k+1);

% Finds the total sum of the array.

total(t) = sum(Summ);

Message(t) = {['The summation of ' num2str(n) ' terms is ' num2str(total(t))]};

end

for t = 1:3

msgbox(Message(t));

end

%% In-Class Exercise #8

% Plots the area of the geometrical shapes

% Creates an array of 10 evenly spaced values between 1 and 2

close all; clear all; clc

a = linspace(1,2,10);

as = a.^2;

ac = pi/4.\*a.^2;

at = (sqrt(3)/4).\*a.^2;

y = linspace(1,2,10);

figure(1); plot(a,as,a,ac,a,at);hold on;

xlabel('a');ylabel('Area'); title('Area vs. change in a');

legend('Area of Rectangle', 'Area of a Circle', 'Area of a traingle','Location','NorthEastOutside')