Name: Andrew Brown	**Lab Time** *(ECampus write "ECampus")***: T 12:00**

Names of people you worked with:
Kevin Daellenbach Hannah Gamache

Websites you used:

Approximately how many hours did it take you to complete this assignment (to nearest whole number)?	10

By writing or typing your name below you affirm that all of the work contained herein is your own, and was not copied or copied and altered.

Andrew Brown

Note: Failure to sign this page will result in a 50-point penalty. Failure to list people you worked with may result in no grade for this homework. Failure to fill out hours approximation will result in a 10-point penalty.

Learning Objectives:

- Fun with struct
- Optimization
- More fun with fitting

Grading Checkpoints

Criteria	Component	No	Yes
[20%] Comments and Pseudocode	Declared units on all variables?		
	English description of problem at top?		
	Comments outlining your steps?		
[10%] Output formatting	Used fprintf() to make complete sentences (when required)?		
	Correct units on answers?		
	Correct number of decimal places?		
[70%] Functionality	Script computes correct value(s)?		
	Correctly converted units in script when needed?		

Problem 1

Before starting with this problem, watch the following video that explains a thought experiment about a concept in human behavior called The Tragedy of The Commons:

https://ed.ted.com/lessons/what-is-the-tragedy-of-the-commons-nicholas-amendolare

In this problem, you are asked to build a Matlab program that replicates the fisher (fisherman/fisherwomen) thought experiment. The Matlab program should offer the following features:

1- Briefly explain the rules of the simulation game to the user.
2- Start the simulation with 12 fish in the pond on day one and asks the user to provide input for how many fish each one of the **four** fishers will aim to catch for each day.
3- Allow the user to choose between manually inputting the fishers behavior for each day or to input the fishers behavior for the first day and automatically repeat the same input for the following days.
    - Considerations for this part:
        - You should ask the user a question that can be answered with 'Y' or 'N'. You should accept both lower case and upper case responses (*hint:* use ***strcmpi)***.
        - You should also warn the user if they enter an invalid response (such as "yes","no","123",etc) and keep asking them to input 'Y' or 'N' until they do so.
4- Print out to the user a daily count of the fish in the pond.
5- End the simulation if:
    a. The fishers practices are sustainable (yielding to the same number of fish) for two consecutive days. And explain that to the user.
    b. The fishers practices lead to the extermination of the fish from the pond. Explain that to the user and print out how many fish remain on the last day where there is not enough fish for all four fishers. (Remember, you can't have negative number).

Reminder: remember to avoid infinite loops. If you end up having an infinite loop, press ctrl+C to stop and abort executing the code.

Extra credit [+50pts]: Save the following data into a text file in a table format: how many fish each fisher attempts to catch every day and a daily count of the fish in the pond. Your table must contain text headers in the first row and first column.

Self-check: At the end of this document, there are three sample runs of how your simulation screen should look like. **To earn full credit, your code should produce the right numbers and have all the functionality shown.**

Comments for grader/additional information (if any)

I did the extra credit

Script File

```
%Andrew Brown Homework 8 Problem 1

clc
clear

%Tragedy of the Commons Fish Example Practice with Structs

fprintf(strcat('This is an educational interactive simulation that\n',...
    'teaches the concept Tragedy of The Commons.\nYou will start with a',...
    ' specific number of fish in the lake.\nThe four fishers will be able',...
    ' to catch as many fish they want\nin the lake every day.\nBut the fish',...
    ' will reproduce and grow by the next morning\nat a rate of 0.5 of what',...
    ' is left in the lake.\n\nThe simulation starts now:\n\n'))

fish.Total(1) = 12; %Initialize the number of fish in the pond
rate=1.5; %fish reproduction rate per day

%Print out the # on fish in the pond on day 1
fprintf('Day 1: There is %0.0f fish in the lake\n\n', fish.Total)

%print out the # of fish each fisher will try to catch
fish.Abe(1) = input('How many fish will Abe try to catch?\n');
fish.Barbra(1) = input('How many fish will Barbra try to catch?\n');
fish.Cat(1) = input('How many fish will Cat try to catch?\n');
fish.Dave(1) = input('How many fish will Dave try to catch?\n');

%End the simulation if they fish all the fish out of the pond on day 1
if fish.Total(1)<=(fish.Abe(1)+fish.Barbra(1)+fish.Cat(1)+fish.Dave(1))
    fprintf('Too Bad!\nThe Tragedy of the commons in upon us!\n')
    fprintf('You fished all 12 fish on day 1 ya idiot!\n')
    return %end script
end

%Ask the user if they would like to automate and separate code into 2 parts
automate = ["Y","N"]; %string for comparison for yes or no to automation
sim=input('Would you like to automate the fishers behavior until the end of the simulatio
or N\n','s'); %Ask the use for a Y or N input

%Keep asking the user for Y or N until they have the proper input
while strcmpi(sim,automate(1))==0 && strcmpi(sim,automate(2))==0
    sim=input('Invalid entry, Please press Y or N\n','s');
end

% This is where the code splits into 2 branches, automated and not
if strcmpi(sim,automate(1))==1 %run if user input is "Y"
    i=1; %add a counter
    %Run while the total number of fish in the pond can be fished
```

```
    while fish.Total(i)>= fish.Abe(i)+fish.Barbra(i)+fish.Cat(i)+fish.Dave(i)
        fish.Abe(i+1)=fish.Abe(i); %Automate Abe's fishing
        fish.Barbra(i+1)=fish.Barbra(i); %Automate Barbra's fishing
        fish.Cat(i+1)=fish.Cat(i); %Automate Cat's fishing
        fish.Dave(i+1)=fish.Dave(i); %Automate Dave's fishing
        fish.Total(i+1)=floor(rate*(fish.Total(i)-fish.Abe(i)-fish.Barbra(i)-fish.Cat(i)-
fish.Dave(i)));
        i=i+1; %Add 1 to the counter
        check=0;
        if fish.Total(i)==fish.Total(i-1) %if the # of fish in the pond stays the same ov
            check=1; %check if sustainable
            fprintf('Well done!\nIt looks like the practices of the fishers are sustainab
            fprintf('There will be %0.0f fish in the lake for a very long time\n',fish.To
            break %end the loop
        end
    end
    if check==0 %if the fishing practices are not sustainable
        fprintf('Too Bad!\nThe Tragedy of the commons in upon us!\n')
        fprintf('There is only %0.0f fish in the lake by day %0.0f. Not enough to feed
everyone.\n',fish.Total(end),i)
    end
elseif strcmpi(sim,automate(2))==1 %Run if user input is "N"
    i=1; %add a counter
    while fish.Total(i)>= fish.Abe(i)+fish.Barbra(i)+fish.Cat(i)+fish.Dave(i) %run while
is greater than fish taken
        fish.Total(i+1)=floor(rate*(fish.Total(i)-fish.Abe(i)-fish.Barbra(i)-fish.Cat(i)-
fish.Dave(i))); %Calculate total fish in lake in the morning
        if fish.Total(end)<=4 %end the loop if there is not enough fish for everyone to e
            break
        end
        fprintf('Day %0.0f: There are %0.0f fish in the lake\n\n',i+1,fish.Total(i+1)) %P
day and total fish
        fish.Abe(i+1)=input('How many fish will Abe try to catch?\n'); %Get user to give
of fish caught
        fish.Barbra(i+1)=input('How many fish will Barbra try to catch?\n'); %Get user to
amount of fish caught
        fish.Cat(i+1)=input('How many fish will Cat try to catch?\n'); %Get user to give
of fish caught
        fish.Dave(i+1)=input('How many fish will Dave try to catch?\n'); %Get user to giv
amount of fish caught
        i=i+1; %add 1 to counter
    end
    if fish.Total(i+1)<fish.Abe(i)+fish.Barbra(i)+fish.Cat(i)+fish.Dave(i) %run while tot
greater than fish taken
        fprintf('Too bad!\nThe tragedy of the commons is upon us!\n')
        fprintf('There is only %0.0f fish in the lake by day %0.0f. Not enough to feed
everyone.\n',fish.Total(end),i+1)
    end
end

%Extra Credit: Write the Data to a text file
fid=fopen('FishData.txt','wt+'); %open the new file and write to it
fprintf(fid,'Abe,Barbra,Cat,Dave,Total\n'); %give titles to each column
for i=1:length(fish.Abe) %loop for length of rows

fprintf(fid,'%0.0f,%0.0f,%0.0f,%0.0f\n',fish.Abe(i),fish.Barbra(i),fish.Cat(i),fish.Dave(
```

```
end
fclose(fid); %close the file
```

Function Files (if any)

```
% Copy and paste your functions here. Must be size 10, same as MATLAB font
and color.
```

Command Window Output

```
This is an educational interactive simulation that
teaches the concept Tragedy of The Commons.
You will start with a specific number of fish in the lake.
The four fishers will be able to catch as many fish they want
in the lake every day.
But the fish will reproduce and grow by the next morning
at a rate of 0.5 of what is left in the lake.

The simulation starts now:

Day 1: There is 12 fish in the lake

How many fish will Abe try to catch?
1
How many fish will Barbra try to catch?
1
How many fish will Cat try to catch?
1
How many fish will Dave try to catch?
1
Would you like to automate the fishers behavior until the end of the
simulation? Press Y or N
y
Well done!
It looks like the practices of the fishers are sustainable!
There will be 12 fish in the lake for a very long time
>>

This is an educational interactive simulation that
teaches the concept Tragedy of The Commons.
You will start with a specific number of fish in the lake.
The four fishers will be able to catch as many fish they want
in the lake every day.
But the fish will reproduce and grow by the next morning
at a rate of 0.5 of what is left in the lake.

The simulation starts now:

Day 1: There is 12 fish in the lake

How many fish will Abe try to catch?
2
How many fish will Barbra try to catch?
1
```

```
How many fish will Cat try to catch?
2
How many fish will Dave try to catch?
1
Would you like to automate the fishers behavior until the end of the
simulation? Press Y or N
N
Day 2: There are 9 fish in the lake

How many fish will Abe try to catch?
1
How many fish will Barbra try to catch?
1
How many fish will Cat try to catch?
1
How many fish will Dave try to catch?
1
Day 3: There are 7 fish in the lake

How many fish will Abe try to catch?
2
How many fish will Barbra try to catch?
2
How many fish will Cat try to catch?
1
How many fish will Dave try to catch?
1
Too bad!
The tragedy of the commons is upon us!
There is only 1 fish in the lake by day 4. Not enough to feed everyone.
>>

This is an educational interactive simulation that
teaches the concept Tragedy of The Commons.
You will start with a specific number of fish in the lake.
The four fishers will be able to catch as many fish they want
in the lake every day.
But the fish will reproduce and grow by the next morning
at a rate of 0.5 of what is left in the lake.

The simulation starts now:

Day 1: There is 12 fish in the lake

How many fish will Abe try to catch?
1
How many fish will Barbra try to catch?
2
How many fish will Cat try to catch?
3
How many fish will Dave try to catch?
1
Would you like to automate the fishers behavior until the end of the
simulation? Press Y or N
yessss
Invalid entry, Please press Y or N
```

```
yepp
Invalid entry, Please press Y or N
y
Too Bad!
The Tragedy of the commons in upon us!
There is only 0 fish in the lake by day 3. Not enough to feed everyone.
>>
```

Self-check screens for problem 1 (Tragedy of The Commons).

Run 1:

```
This is an educational interactive simulation that teaches the concept Tragedy of The
Commons.
You will start with a specific number of fish in the lake.
The four fishers will be able to catch as many fish they want in the lake every day.
But the fish will reproduce and grow by the next morning at a rate of 0.5 of what is left in the
lake.

The simulation starts now:

Day 1: There is 12 fish in the lake

How many fish will fisher Abe try to catch?
1
How many fish will fisher Barbra try to catch?
1
How many fish will fisher Cat try to catch?
1
How many fish will fisher Dave try to catch?
1
would you like to automate the fishers behavior until the end of this simulation? Press Y or N
y
Well done!
It looks like the practices of the fishers are sustainable!
There will be 12 fish in the lake for very long time
>>
```

Run 2:

```
This is an educational interactive simulation that teaches the concept Tragedy of The
Commons.
You will start with a specific number of fish in the lake.
The four fishers will be able to catch as many fish they want in the lake everyday.
But the fish will reproduce and grow by the next morning at a rate of 0.5 of what is left in the
lake.
```

```
The simulation starts now:

Day 1: There is 12 fish in the lake

How many fish will fisher Abe try to catch?
2
How many fish will fisher Barbra try to catch?
1
How many fish will fisher Cat try to catch?
2
How many fish will fisher Dave try to catch?
1
would you like to automate the fishers behavior until the end of this simulation? Press Y or N
N
Day 2: There is 9 fish in the lake

How many fish will fisher Abe try to catch?
1
How many fish will fisher Barbra try to catch?
1
How many fish will fisher Cat try to catch?
1
How many fish will fisher Dave try to catch?
1
Day 3: There is 7 fish in the lake

How many fish will fisher Abe try to catch?
2
How many fish will fisher Barbra try to catch?
2
How many fish will fisher Cat try to catch?
1
How many fish will fisher Dave try to catch?
1
Too bad!
The tragedy of the commons is upon us!
There is only have 1 fish in the lake by day 4. Not enough to feed everyone
>>
```

Run 3:

```
This is an educational interactive simulation that teaches the concept Tragedy of The
Commons.
You will start with a specific number of fish in the lake.
The four fishers will be able to catch as many fish they want in the lake everyday.
```

```
But the fish will reproduce and grow by the next morning at a rate of 0.5 of what is left in the
lake.

The simulation starts now:

Day 1: There is 12 fish in the lake

How many fish will fisher Abe try to catch?
1
How many fish will fisher Barbra try to catch?
2
How many fish will fisher Cat try to catch?
3
How many fish will fisher Dave try to catch?
1
would you like to automate the fishers behavior until the end of this simulation? Press Y or N
yessss
Invalid entry, Please press Y or N
yepp
Invalid entry, Please press Y or N
y
Day 2: There is 7 fish in the lake

Too bad!
The tragedy of the commons is upon us!
There is only 0 fish in the lake by day 3. Not enough to feed everyone
```

Problem 2

(150 pts)

The Richter magnitude scale is a method to measure the magnitude of an earthquake. It assigns a magnitude number to quantify the energy released by an earthquake. However, this is not the only method to measure the magnitude of an earthquake.

The Kelly Kiloton Index (KKI), formulated in 2006 by H. A. Kelly of UCLA in consultation with Geoffrey Mess of the UCLA Math Department, aims at giving a "realistic" picture of earthquake energy (equivalent energy released by an explosion of TNT). It uses the kiloton (1000 metric tons = 2,200,000 lbs) as the basic unit (Source: UCLA Department of English).

The following table shows the Richter scale measure and its approximate amount of energy released in kiloton.

Richter Scale	Kelly Kiloton Index
2.0	0.001
2.5	0.006
3.0	0.032
3.5	0.180
6.0	1000.000
6.1	2000.000
8.5	5600000.000
8.6	8000000.000
9.9	500000000.000
10.0	1000000000.000

Deliverables:

1. Make a scatterplot where the Richter scale is the independent variable, and the Kelly Kiloton Index is the dependent variable (10 points).
2. Try different polynomial fits for the data set, and ***plot*** each fit into a separate graph:
    a. Linear equation ($y = mx + b$). For this case, you must use matrix operations to find the values of m and b (15 points).
    b. Quadratic equation ($y = ax^2 + bx + c$). For this case, you must use matrix operations to find the values of a, b, and c (15 points).
    c. Exponential equation ($y = b * e^{mx}$) (15 points).
    d. Power equation ($y = b * x^m$) (15 points).
    e. Logarithmic equation ($y = a + b*\ln(x)$) (15 points).
3. Which fit represented the data the best and why? (15 points). ***Type your answer below*.**
4. Using the best fit equation, find the corresponding Kelly Kiloton index value for a Richter scale of 5 (15 points). ***Print your answer.***

5. Using the best fit equation, if you have been told that a building structure proposal can withstand 4,000,000 kilotons, and the historic record of earthquakes in town has never exceeded 7.0 Richter scale…
    a. What is the largest earthquake this proposed building can withstand? (answer in Richter scale) (20 points). ***Print your answer.***
    b. Would you accept or reject the building structure proposal? (15 points) ***Print your answer.***

Self-check:
5a) `x.4 Richter scale`

Comments for grader/additional information (if any)

Script File

```
%Andrew Brown Homework 8 Problem 2

clc
clear

% Richter Scale

%Define the given table
RichterScale=[2,2.5,3,3.5,6,6.1,8.5,8.6,9.9,10]; %Richter scale
KKI=[1e-3,6e-3,3.2e-2,0.18,10e4,2e4,5.6e6,8e6,5e8,1e9]; %Kelly Kiloton Index

%Data Points
subplot(2,3,1)
plot(RichterScale,KKI,'.r','Markersize',15)
xlabel('Richter Scale')
ylabel('Kelly Kiloton Index')
title('Data Points')

%Linear
P1=polyfit(RichterScale,KKI,1);
polyFunc1=@(RichterScale) polyval(P1,RichterScale);
subplot(2,3,2)
plot(RichterScale,KKI,'.r','Markersize',15)
hold on
fplot(polyFunc1)
xlabel('Richter Scale')
ylabel('Kelly Kiloton Index')
title('Linear Fit')

%Quadratic
P2=polyfit(RichterScale,KKI,2);
polyFunc2=@(RichterScale) polyval(P2,RichterScale);
subplot(2,3,3)
plot(RichterScale,KKI,'.r','Markersize',15)
```

```
hold on
fplot(polyFunc2)
xlabel('Richter Scale')
ylabel('Kelly Kiloton Index')
title('Quadratic Fit')

%Exponential
PExp=polyfit(RichterScale,log(KKI),1);
polyFuncExp=@(RichterScale) exp(PExp(2))*exp(PExp(1)*RichterScale);
subplot(2,3,4)
plot(RichterScale,KKI,'.r','Markersize',15)
hold on
fplot(polyFuncExp)
xlabel('Richter Scale')
ylabel('Kelly Kiloton Index')
title('Exponential Fit')

%Power
PPo=polyfit(log(RichterScale),log(KKI),2);
polyFuncPo=@(RichterScale) polyval(PPo,exp(RichterScale));
subplot(2,3,5)
plot(RichterScale,KKI,'.r','Markersize',15)
hold on
fplot(polyFuncPo)
xlabel('Richter Scale')
ylabel('Kelly Kiloton Index')
title('Power Fit')

%Logartithmic
PLog=polyfit(log(RichterScale),KKI,1);
polyFuncLog=@(RichterScale) PLog(1)*log(RichterScale)+PLog(2);
subplot(2,3,6)
plot(RichterScale,KKI,'.r','Markersize',15)
hold on
fplot(polyFuncLog)
xlabel('Richter Scale')
ylabel('Kelly Kiloton Index')
title('Logarithmic Fit')

%Exponential is the best fit for the data
newVal=polyFuncExp (5); %Calculate exponential @ richter=5

%Calculate the inverse of the exponential functions
polyFuncBuilding=@(KKI) (1/PExp(1))*log(KKI/exp(PExp(2)));
Mag=polyFuncBuilding(4000000);

fprintf('The KKI for a richter of 5 is %0.2f\n',newVal)
fprintf('4 million KKI is created from a %0.2f Richter earthquake\n',Mag)
fprintf('I would not accept the building proposal for a building that can
only withstand a 7.0 quake\n')
```

Function Files (if any)

```
% Copy and paste your functions here. Must be size 10, same as MATLAB font
and color.
```

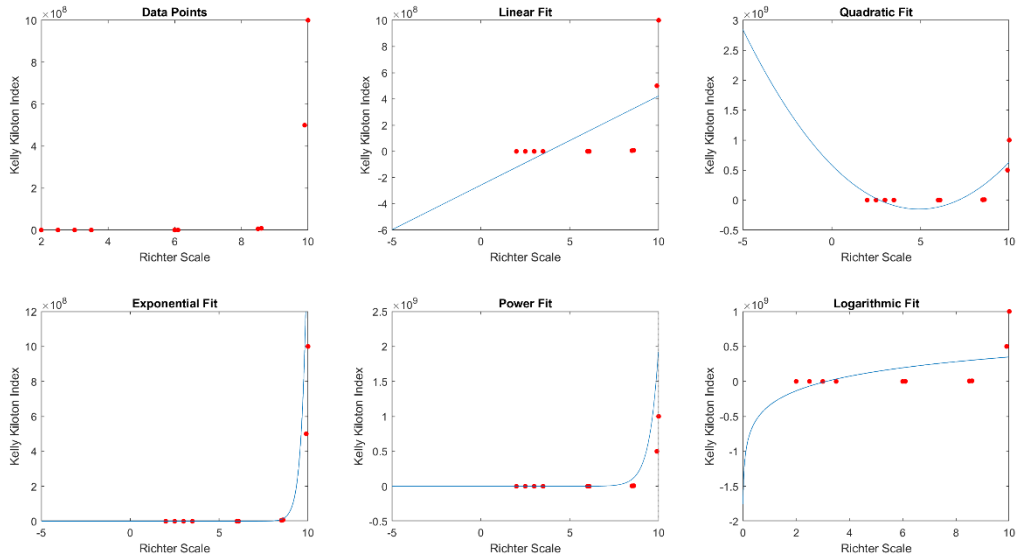
Command Window Output

```
The KKI for a richter of 5 is 64.75
4 million KKI is created from a 8.21 Richter earthquake
I would not accept the building proposal for a building that can only
withstand a 7.0 quake
```

Answers to question(s) asked in the homework (if any)

The exponential fit curve worked the best because of the nature of the data

Image Output



Problem 3 – Struct

Take an existing problem from the homeworks where you've written a function that has more than one parameter (epidemic or teacup are good examples). Modify your script and your function so that you pass one struct with the parameters as field values instead of passing all the parameters individually. I.e., if you have func(x,y,z), replace this with a struct that has 3 fields x,y,z and pass the struct in instead.

Deliverables: Turn in the script and the function file and the output to show that your script still works.

Comments for grader/additional information (if any)

Homework 7 Problem 3 TSE 4

Script File

```
%Andrew Brown Homwork 8 Problem 3

clc
clear

%Total Solar Eclipse Part 4 Redux w/ structs passing through the function
%Read the file with the data and consolidate the data by column
data=dlmread('TSEData.csv'); %read in the file using dlmread
saros.Num=data(:,1);
saros.Month=data(:,2);
saros.Day=data(:,3);
saros.Year=data(:,4);
saros.Saros=data(:,5);
saros.Hour=data(:,6);
saros.Minute=data(:,7);
saros.Second=data(:,8);
saros.Mag=data(:,9);
saros.Hour2=data(:,10);
saros.Minute2=data(:,11);
saros.Second2=data(:,12);

%Use 2 given pairs of saros dates to calculate the length of a saros cycle
[sarosCalc] = SarosCycleCount(saros); %call calculating fucntion
fprintf('SarosCalc = %0.3f\n',sarosCalc) %print my calculated saros cycle

[enhancedSarosCalc] = EnhancedSarosCycleCalc(saros);
fprintf('EnhancedSarosCalc = %0.3f\n',enhancedSarosCalc)

%Calculate the dates of future TSEs using datevec function
firstSarosNum=ones(9,1); %preallocate variable
secondSarosNum=ones(9,1); %preallocate variable
Y=ones(9,1); %preallocate variable
M=ones(9,1); %preallocate variable
D=ones(9,1); %preallocate variable
for i=3:11 %call the proper indices from the imported file
```

```
    firstSarosNum(i-
2)=datenum([saros.Year(i),saros.Month(i),saros.Day(i),saros.Hour(i),saros.Minute(i),saros
the date numbers of the past TSEs
    secondSarosNum(i-2)=firstSarosNum(i-2)+enhancedSarosCalc; %calculate the date nums of
    [Y(i-2),M(i-2),D(i-2)] = datevec(secondSarosNum(i-2)); %convert date nums to actual d
end

%Define numbers for writing
sarosNum=([152 139 126 136 146 133 120 130 145]); %define saros numbers
count=14:23; %define counting numbers

%Print out the dates in the command window
fprintf('Date          Saros\n') %Command window column titles
for i=1:length(sarosNum)
    fprintf('%0.0f/%0.0f/%0.0f      %0.0f\n',D(i),M(i),Y(i),sarosNum(i)) %print
end

%Create a matrix out of the calcualted data to write to the data file
matrix=ones(9,5); %preallocate matrix
for i=1:length(sarosNum)
    matrix(i,:)=[count(i),M(i),D(i),Y(i),sarosNum(i)];
end

%Append the data file with the new data calculated
dlmwrite('TSEData.csv',matrix,'-append','delimiter',',')
```

Function Files

```
function [sarosCalc] = SarosCycleCount(saros)
%SAROSCYCLECOUNT calculates the length of a saros cycle in days

%Do the needed year and month conversions into days
daysInASecond=1/86400; %Average number of days in a second
daysInAMinute=1/1440; %Average number of days in a minute
daysInAnHour=1/24; %Average number of days in an hour
daysInAMonth=30.44; %Average number of days in a month
daysInAYear=365.2425; %Average number of days in a year


%Calculate the first saros cycle (saros 127) using 2 given dates
firstsaros127=saros.Year(1)*daysInAYear+saros.Month(1)*daysInAMonth+saros.Day(1)+saros.Ho
first date
secondsaros127=saros.Year(12)*daysInAYear+saros.Month(12)*daysInAMonth+saros.Day(12)+saro
of second date
saros127=secondsaros127-firstsaros127; %days between the 2 dates

%Calculate the second saros cycle (saros 142) using 2 given dates
firstsaros142=saros.Year(2)*daysInAYear+saros.Month(2)*daysInAMonth+saros.Day(2)+saros.Ho
first date
```

```
secondsaros142=saros.Year(13)*daysInAYear+saros.Month(13)*daysInAMonth+saros.Day(13)+saro
of second date
saros142=secondsaros142-firstsaros142; %days between the 2 dates

%Calculate the average of the two saros cycles
sarosCalc=(saros127+saros142)/2;



function [enhancedSarosCalc] = EnhancedSarosCycleCalc(saros)
%   ENHANCEDSAROSCYCLECLAC Caluclates the length of the saros cycle using
%   special matlab date functions

%Calculate the saros cycle for saros 127
firstsaros127=datenum([saros.Year(1),saros.Month(1),saros.Day(1),saros.Hour(1),saros.Minu
secondsaros127=datenum([saros.Year(12),saros.Month(12),saros.Day(12),saros.Hour(12),saros
saros127=secondsaros127-firstsaros127; %days between the 2 dates

%Calculate the saros cycle for saros 142
firstsaros142=datenum([saros.Year(2),saros.Month(2),saros.Day(2),saros.Hour(2),saros.Minu
secondsaros142=datenum([saros.Year(13),saros.Month(13),saros.Day(13),saros.Hour(13),saros
saros142=secondsaros142-firstsaros142;  %days between the 2 days

%calcualte the average between the 2 saros cycles
enhancedSarosCalc=(saros127+saros142)/2;
end
```

Command Window Output (if any)

```
SarosCalc = 6585.419
EnhancedSarosCalc = 6585.334
Date          Saros
4/12/2021      152
8/4/2024      139
12/8/2026      126
2/8/2027      136
22/7/2028      146
25/11/2030      133
30/3/2033      120
20/3/2034      130
2/9/2035      145
>>
```

Image Output (if any)

Copy and paste images here

Problem 4 – Survey [25 pts]

Complete the on-line survey. Put the result code here: **MATLABISFUNCOMPLETEDSURVEY**