

February 9, 2022

Problem 2.34

---(insert your solution here)

```
clear,clc
```

```
% Nick McCullough, Aere 161, HW2, Problem 2.34
```

```
% Find the following sum by first creating vectors for the numerators
```

```
% and denominators: 3/1 + 5/2 + 7/3 + 9/4
```

```
A = [3:2:9] % A is the variable for numerators vector, 3-9 with 2 step
```

```
B = [1:4] % B is the variable for denominators vector
```

```
C = (A./B) % C is the variable that creates the fractions between A & B
```

```
Z = sum(C) % Z is the variable that sums C, the fractions
```

```
disp('the sum of the fractions is') % displays statement explaining Z
```

```
disp(Z) % displays sum Z
```

Output 1:

-----*(insert output (your results) here)*

A =

3 5 7 9

B =

1 2 3 4

C =

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3.0000 2.5000 2.3333 2.2500

Z =

10.0833

the sum of the fractions is

10.0833

Problem 4.9

- - - *-(insert your solution here)*

```
clear,clc
```

```
% Nick McCullough, Aere 161, HW 2, Problem 4.9
```

```
% A data file "parttolerance.dat" stores, on one line, a part number, and the  
% minimum and maximum values for the valid range that the part could weigh.
```

```
% Write a script "parttol" that will read these values from the file,
```

```
% prompt the user for a weight, and print whether or not that weight is within range.
```

```
% Create a sample data file; for example, the file might store the following:
```

```
% >> type parttolerance.dat
```

```
% ans =% 123 44.205 44.287
```

```
load parttolerance.dat % loads the data which is just on a single line
```

```
% start by creating variables for the loaded data, below.
```

```
partnumber = parttolerance(1); % variable identifying the part # 123 from parttolerance
```

```
minweight = parttolerance(2); % variable identifying the part min weight
```

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```
maxweight = parttolerance(3); % variable identifying the part max weight
partweight = input('Enter the part weight: '); % input function for user

if partweight > minweight && partweight < maxweight % if statement creating the range
    fprintf('The part %d is within range\n',partnumber)
    % prints the confirmation of part weight is in range

    else fprintf('The part %d is not in range\n',partnumber)
        % prints the confirmation of part weight is not in range
end
```

Output 1:

-----(*insert output (your results) here*)

Enter the part weight: 44.206

The part 123 is within range

Output 2:

-----(*insert output (your results) here*)

Enter the part weight: 20

The part 123 is not in range

Problem 4.16

- - - (*insert your solution here*)

```
clear,clc
```

```
% Nick McCullough, Aere 161, HW 2, Problem 4.16
```

```
% In chemistry, the pH of an aqueous solution is a measure of acidity.
```

```
% The pH scale ranges from 0 to 14, inclusive.
```

```
% A solution with a pH of 7 is said to be neutral,
```

```
% a solution with a pH greater than 7 is basic,
```

```
% and a solution with a pH less than 7 is acidic.
```

```
% Write a script that will prompt the user for the pH of a solution,
```

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```
% and will printer whether it is neutral, basic, or acidic.
% If the user enters an invalid pH, an erro message will be printed.
% start with a disp introduction piece, advising user pH scale range
disp('The pH scale is a range from 0-14, with 7 being neutral.')
disp('Any value under 7 is acidic, any value over 7 is basic.')
input('Please enter the pH of your solution: '); % user enters pH
if ans == 7 % equal operator defining neutral, fun prints below
    fprintf('The pH of your solution is neutral, awesome!');
elseif ans > 7 && ans <= 14 % using && for two expressions
    fprintf('The pH of your solution is basic, sweet!');
elseif ans >= 0 && ans < 7 % using && for two expressions
    fprintf('The pH of your solution is acidic, cool!');
else % else to advise error below because user didn't follow range
    fprintf('Error 48A267. Please try again.');
```

end

Output 1:

-----(*insert output (your results) here*)

The pH scale is a range from 0-14, with 7 being neutral.

Any value under 7 is acidic, any value over 7 is basic.

Please enter the pH of your solution: 7

The pH of your solution is neutral, awesome!>>

Output 2:

-----(*insert output (your results) here*)

The pH scale is a range from 0-14, with 7 being neutral.

Any value under 7 is acidic, any value over 7 is basic.

Please enter the pH of your solution: 5

The pH of your solution is acidic, cool!>>

Output 3:

-----(*insert output (your results) here*)

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The pH scale is a range from 0-14, with 7 being neutral.

Any value under 7 is acidic, any value over 7 is basic.

Please enter the pH of your solution: 12

The pH of your solution is basic, sweet!>>

Problem 4.20

- - - *-(insert your solution here)*

```
clear,clc
```

```
% Nick McCullough, Aere 161, HW2, Problem 4.20
```

```
% In aerodynamics, the Mach number is a critical quantity.
```

```
% It is defined as the ratio of the speed of an object (e.g., an aircraft)
```

```
% to the speed of sound. If the Mach number is less than 1, the flow is
```

```
% subsonic; if the Mach number is greater than 1, the flow is supersonic.
```

```
% Write a script that will prompt the user for the speed of an aircraft and
```

```
% the speed of sound at the aircraft's current altitude and will print
```

```
% whether the condition is subsonic, transonic or supersonic.
```

```
% % M = Mach
```

```
% % V = Velocity of aircraft (user input)
```

```
% % C = Speed of Sound at current altitude of aircraft (user input)
```

```
disp('Mach Speed is the ratio of speed to the speed of sound') % Mach speed
```

```
disp('Mach 1 is Transonic') % displaying Transonic speed
```

```
disp('speed below Mach 1 is Subsonic') % displaying Subsonic speed
```

```
disp('speed above Mach 1 is Supersonic') % displaying Supersonic speed
```

```
disp('speed above Mach 5 is Hypersonic') % displaying Hypersonic speed
```

```
V = input('Please enter current aircraft speed in mph, V: ') % user input
```

```
C = input('Please enter Speed of Sound at current altitude in mph, C: ') % user input
```

```
M = V / C % described equation above
```

```
if M == 1 % equal operator defining Mach 1
```

```
    fprintf('You are traveling Transonic');
```

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```
elseif M > 5
    fprintf('You are traveling Hypersonic');
elseif M > 1 && M < 5 % using && for two expressions
    fprintf('You are traveling Supersonic');
elseif M >= 0 && M < 1 % using && for two expressions
    fprintf('You are traveling Subsonic');
else M < 0 % else to advise error
    fprintf('Error, you are going back in time. Please try again.');
```

end

Output 1:

-----(*insert output (your results) here*)

Mach Speed is the ratio of speed to the speed of sound

Mach 1 is Transonic

speed below Mach 1 is Subsonic

speed above Mach 1 is Supersonic

speed above Mach 5 is Hypersonic

Please enter current aircraft speed in mph, V: 4000

V =

4000

Please enter Speed of Sound at current altitude in mph, C: 4000

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C =

4000

M =

1

You are traveling Transonic>>

Output 2:*----- (insert output (your results) here)*

Mach Speed is the ratio of speed to the speed of sound

Mach 1 is Transonic

speed below Mach 1 is Subsonic

speed above Mach 1 is Supersonic

speed above Mach 5 is Hypersonic

Please enter current aircraft speed in mph, V: 2000

V =

2000

Please enter Speed of Sound at current altitude in mph, C: 5000

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C =

5000

M =

0.4000

You are traveling Subsonic>>

Output 3:

-----*(insert output (your results) here)*

Mach Speed is the ratio of speed to the speed of sound

Mach 1 is Transonic

speed below Mach 1 is Subsonic

speed above Mach 1 is Supersonic

speed above Mach 5 is Hypersonic

Please enter current aircraft speed in mph, V: 4000

V =

4000

Please enter Speed of Sound at current altitude in mph, C: 1000

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C =

1000

M =

4

You are traveling Supersonic>>

Output 4:*----- (insert output (your results) here)*

Mach Speed is the ratio of speed to the speed of sound

Mach 1 is Transonic

speed below Mach 1 is Subsonic

speed above Mach 1 is Supersonic

speed above Mach 5 is Hypersonic

Please enter current aircraft speed in mph, V: 6000

V =

6000

Please enter Speed of Sound at current altitude in mph, C: 1000

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C =

1000

M =

6

You are traveling Hypersonic>>

Output 5:*----- (insert output (your results) here)*

Mach Speed is the ratio of speed to the speed of sound

Mach 1 is Transonic

speed below Mach 1 is Subsonic

speed above Mach 1 is Supersonic

speed above Mach 5 is Hypersonic

Please enter current aircraft speed in mph, V: 5000

V =

5000

Please enter Speed of Sound at current altitude in mph, C: 1000

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C =

1000

M =

5

ans =

logical

0

Error, you are going back in time. Please try again.>>

Problem 4.23

- - - *(insert your solution here)*

```
clear,clc
```

```
% Nick McCullough, Aere 161, HW 2, Problem 4.23
```

```
% The Beaufort Wind Scale is used to characterize the strength of winds.
```

```
% The 346.5000 720.0000 150.0000 scale uses integer values and goes from a force of 0, which  
is no wind,
```

```
% up to 12, which is a hurricane. The following script first generates a random force value.
```

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% Then, it prints a message regarding what type of wind that force represents, using a switch statement.

% You are to re-write this switch statement as one nested if-else statement

% that accomplishes exactly the same thing. You may use else and/or elseif clauses.

% integers from 0-12, a value on the Beaufort Wind Scale. We are to

% generate one of these random integers

```
disp('the variable x describes the Beaufort Wind Scale from 0-12')
```

```
disp('with 0 being no wind and 12 being hurricane power winds')
```

```
x = round(rand*12) % variable equal to random equation to generate a number 1-12
```

```
switch x % switch x, the variable
```

```
    case {0} % equation if x less than or equal to 0
```

```
        disp('No wind at this time') % no wind
```

```
    case {1,2,3,4,5,6} % using case 1-6
```

```
        disp('There is a little wind at this time') % kind of windy
```

```
    case {7,8,9} % using case 7-9
```

```
        disp('It is very windy right now') % very windy
```

```
    case {10,11} % using case 10-11
```

```
        disp('You are in a storm, seek shelter') % storm season
```

```
    otherwise % otherwise statement for all other numbers aka 12
```

```
        disp('It is Hurricane season baby, best of luck') % hurricane
```

```
end
```

Output 1:

-----(*insert output (your results) here*)

the variable x describes the Beaufort Wind Scale from 0-12

with 0 being no wind and 12 being hurricane power winds

x =

0

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No wind at this time

Output 2:

-----(*insert output (your results) here*)

the variable x describes the Beaufort Wind Scale from 0-12
with 0 being no wind and 12 being hurricane power winds

x =

6

There is a little wind at this time

Output 3:

-----(*insert output (your results) here*)

the variable x describes the Beaufort Wind Scale from 0-12
with 0 being no wind and 12 being hurricane power winds

x =

7

It is very windy right now

Output 4:

-----(*insert output (your results) here*)

the variable x describes the Beaufort Wind Scale from 0-12
with 0 being no wind and 12 being hurricane power winds

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x =

10

You are in a storm, seek shelter

Output 5:

-----(*insert output (your results) here*)

the variable x describes the Beaufort Wind Scale from 0-12
with 0 being no wind and 12 being hurricane power winds

x =

12

It is Hurricane season baby, best of luck