

Ryan Herrmann

Lab 1

Lab Section 03

Topic: The purpose of this lab was to use MATLAB to compute basic equations and to format the output with the proper significant figures and to display them as a table.

Methods: For part one, there were two given numbers and then a series of operations were done and the number of significant figures from the results were calculated and then MATLAB was used to format the results in a table. For part B, MATLAB was used to calculate the shear stress on a blood vessel wall given the radius, pressure, length, and viscosity. For part C, MATLAB was used to calculate the partitioning coefficient given the following variables of Φ , the solute radius, and the fiber radius.

Pseudo Code:

Part A:

1. The input numbers were put into variables.
2. For each case, the code was written out in the case.
3. Results were assigned to a new string variable and using MATLAB, the result was formatted to the correct significant figures.
4. Once all the variables were calculated, a table in MATLAB was created and variables were put into the table.
5. The Table was exported to CSV.
6. Another table with the input variables was created including the number of significant figures and exported to a CSV.

Part B:

1. The input tables were put into variables.
2. The function for the wall shear stress was put into MATLAB.
3. The result was converted to string and the correct number of significant figures were formatted to the number.

Part C:

1. The same process was done as part B, but the numbers were changed, and the function was changed to the equation of partitioning coefficient.

Output:

Input table for Part A:

Variable_Names	Variable_Values	Variable_Significant_Figures
a	3.45	3
b	12.525	5

Output Table Part A:

Cases	Functions	Results	Resulting_Significant_Figures
i	b-a	9.08	3
ii	b/ln(a)	10.11	4
iii	a*log10(b)	3.79	3
iv	e^(b-a)	8.73E+03	3
v	sin(a*pi)	-0.988	3

Output table for wall shear stress and partitioning coefficient:

Final_Values	Final_Results	Significant_Figures
TauW	1.21 Pa	3
Kog	0.236	3

Discussion:

MATLAB was able to show that the calculations could be made, and using strings was able to format the values correctly using significant figures. This was nice to learn how to be able to format the values. Keeping track of significant figures is a complicated task, so there might be a better way in the future to try and code a function to keep track of the significant figures. The formatting is nice, but it is done as a string type, and that may be complicated if in the future, operations need to be made to the variable after getting the right significant figures.

Appendix:

Part A:

```
a = 3.45;
b = 12.525;
sigfigs = 2;
fprintf('%.g', a)
subtract = b-a;
```

```

subtract = round(subtract,sigfigs);
subtract = convertCharsToStrings(sprintf('%.3g',subtract));

natlog = b/log(a);
natlog = sprintf('%.4g',natlog);

logten = a*log10(b);
logten = sprintf('%.3g',logten);

expon = exp(b-a);
expon = sprintf('%.3g',expon);

sinfunct = sin(a*pi);
sinfunct = sprintf('%.3g',sinfunct);

%Table names are in capitols
Cases = ["i","ii","iii","iv","v"];
Functions = ["b-a","b/ln(a)","a*log10(b)","e^(b-a)","sin(a*pi)"];
Results = [subtract,natlog,logten,expon,sinfunct];
Results = transpose(Results);
Resulting_Significant_Figures = [3;4;3;3;3];

finalTable2 = table(Cases,Functions,Results,Resulting_Significant_Figures)

%for table 1
Variable_Names = ["a","b"];
Variable_Values = [3.45;12.525];
Variable_Significant_Figures = [3;5];

finalTable1 = table(Variable_Names,Variable_Values,Variable_Significant_Figures)

%matrix writing
writetable(finalTable1,'InputTable.csv','Delimiter',' ','QuoteStrings',true);
writetable(finalTable2,'OutputTable.csv','Delimiter',' ','QuoteStrings',true);

```

Part B&C:

```

%Part B
%Import Variables
radius = 3.000; %mm
delP = 100.55; %Pa

```

```
L = 12.5; %cm
mu = 0.89; %cP

phif = 0.0875;
as = 5.575; %nm
af = 1.82; %nm

conv1 = 1/1000; % mm-> m
conv2 = 1/100; % cm -> m

vrad = radius*conv1;
vlen = L*conv2;

TauW = ((delP*vrad)/(2*vlen)); %Pa
TauW = convertCharsToStrings(sprintf('%.3g Pa',TauW))

Kog = exp((-1*phif)*(1+(as/af))^2);
Kog = convertCharsToStrings(sprintf('%.3g',Kog))
```