Collect all m-files in a single .zip file and upload the .zip file to the course webpage by midnight on Wednesday, September 4, 2019. Please note any collaborations in the Canvas upload comment box. Each student must upload their own individual copy of the work.

1.1 (4 pts) Create an Excel file that contains salary information (e.g. Column 1 = name, Column 2 = salary). Create an m-file named PS1_1 that reads the Excel file, and reports the following to the command window:

1. Maximum salary
2. Minimum salary
3. Mean salary, rounded to the nearest $1000

Test with the 2019-2020 salary data from the Denver Nuggets (use data from Basketball Insiders[1]). Ignore players for whom salaries are unlisted.

Solution: PS1_1
```
%PS1_1.m
% Insert file name here to be read:
FileName = 'Nuggets_Salaries.xlsx';
% Load the file name:
Data = xlsread(FileName);
% NB: note the names did not get read in, for this problem it is not needed
% For this one you can use fprintf as before or you can just keep the
% variables without semicolon supression
Max_Salary = max(Data)
Min_Salary = min(Data)
% Mean salary rounded to nearest 1000!?  Here's a way to do that
Mean_Salary = mean(Data);
Mean_Salary_rounded = round(Mean_Salary/1000)*1000 %There is a better way to
do this
```

```
Output:
>> PS1_1

Max_Salary =

    30350000

Min_Salary =

      898310

Mean_Salary_rounded =

     8885000
```

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[1] http://www.basketballinsiders.com/denver-nuggets-team-salary/

1.2 (3 pts) Create an m-file named PS1_2.m that asks the user to input the price of a meal, and calculates an 18% tip and rounds UP to the nearest whole dollar amount. (Test with $72.80; the result should be $14).

```
function PS1_2
% Coded by Nigel F. Reuel on 8.25.2016
% Updated by Luke T Roling on 8.26.2019
% Creates an M-file that asks for the meal price and calculates
% an 18% tip and rounds UP to the nearest whole dollar amount.
% (Tested with $72.80, result should be $14).
clc
Cost = input('What was the cost of your meal?');
Tip = ceil(Cost*0.18);
clc
fprintf('You should pay $%4.2f in tip for the meal.\n',Tip)
end
```

Output:

>>You should pay $14.00 in tip for the meal.

1.3 (4 pts) The displacement (Δx) of five Hookean springs is observed corresponding to an applied force F:

Spring	1	2	3	4	5
F, N	14	18	8	9	13
Δx, m	0.013	0.020	0.009	0.010	0.012

Given that $F = k\Delta x$ and $U = \frac{1}{2}k\Delta x^2$ for spring constant k (N/m) and potential energy U (J), write an m-file named PS1_3.m that solves for the spring constants and potential energies for each spring. Use MATLAB to determine the maximum potential energy. Print only the maximum potential energy to the command line.

```
%Script for PS1 Problem 3
%Coded by Luke T Roling on 08.26.2019

%Input vector of forces
F = [14, 18, 8, 9, 13] ; %Force in N
%Input vector of displacements
x = [0.013, 0.020, 0.009, 0.010, 0.012] ; %displacement in m
%Calculate spring constants from formula
%Note: using . operators, we can do this all at once!
k = F./x ; %solve formula for k (N/m)
%Calculate potential energy from formula.
U = 0.5.*k.*x.^2 ; %rearranged potential energy formula (J)

max(U) %Print the maximum potential energy (J) to the command window
```

Output:

\>> PS1_3

ans =

   0.1800

1.4 (4 points) The density of freshwater can be computed as a function of temperature:

$$\rho = (5.5289 \times 10^{-8})T_C^3 - (8.5016 \times 10^{-6})T_C^2 + (6.5632 \times 10^{-5})T_C + 0.99985$$

where ρ is the density (g/cm³) and T_C the temperature (°C). Write an m-file *function* named PS1_4.m that takes an input temperature in FAHRENHEIT and then outputs the density based on the cubic formula. Make sure your function works with both a scalar input (single temperature) or a vector (list of temperatures). In a separate *script*, named PS1_4test.m, test your function by first creating a vector ranging from 32°F to 93.2°F using increments of 3.6 °F and then calling your function to solve for all the densities. Output only the vector of densities to the command window.

Solution: PS1_4

```
function rho = PS1_4(T)
%PS1 Problem 4 Function File
%Coded by Luke T Roling on 08.26.2019
%Calculates density of freshwater
%Input: T (Temperature, degF)
%Output: rho (density, g/cm^3)

%First, convert deg F to deg C
%Note that subtraction and multiplying by a scalar are both
%element-wise operations for vector inputs.
Tc = 5/9.*(T-32);

%Second, we calculate the densities. Note the use of
%element-wise .^ operators, which are essential for
%vector inputs to work correctly.
rho = 5.5289e-8.*Tc.^3 - 8.5016e-6.*Tc.^2+6.5632e-5.*Tc+0.99985;
```

Output:

\>> T = 32:3.6:93.2;

\>> PS1_4(T)

ans =

  Columns 1 through 9

    0.9999   0.9999   1.0000   0.9999   0.9999   0.9997   0.9995   0.9993   0.9990

  Columns 10 through 18

    0.9986   0.9982   0.9978   0.9973   0.9968   0.9962   0.9957   0.9951   0.9944