Problem 1: Solution

```matlab
clear close
all clc
disp('Urban Meyer, Seat #01');
disp('ENGR 1181');
disp('Practice Problem 1'); disp('AU 14 Prof: Woody Hayes');
disp('11/4/14');
g = 9.81;
for i = 1:3
    v0 = input('Enter the initial speed for this launch (m/s): '); theta =
    input('Enter the angle of launch (degrees): '); D(i) = v0^2*sin(2*theta/180*pi)/g;
    fprintf('For Launch %i the distance traveled was %.2f meters
',i,D(i)); end
```

MATLAB Command Window Page 1

```
Urban Meyer, Seat #01 ENGR 1181
AU 14 Prof: Woody Hayes
11/4/14
Enter the initial speed for this launch (m/s): 50 Enter the angle of launch (degrees): 30
For Launch 1 the distance traveled was 220.70 meters
Enter the initial speed for this launch (m/s): 25 Enter the angle of launch (degrees): 60
For Launch 2 the distance traveled was 55.17 meters
Enter the initial speed for this launch (m/s): 36 Enter the angle of launch (degrees): 45
For Launch 3 the distance traveled was 132.11 meters
>>
```
Problem 2: Solution

clear close
all clc
disp('Urban Meyer, Seat #01');
disp('ENGR 1181');
disp('Practice Problem 2'); disp('AU 14 Prof: Woody Hayes');
disp('11/4/14');

% Req = R1 + (1/R2 + 1/R3)^-1;
% This is because R2 and R3 are in parallel
% That combination is in series with R1
%
% Vpower = I1*Req
% I1 = Vpower/Req
% This is because I1 is the current through the power supply traveling
% through the equivalent resistance
%
% V23 = Vpower - I1*R1
% This is because the voltage across the combination in parallel is the
% difference between the supply voltage and the voltage across R1
% V23 = I2*R2
% I2 = V23/R2
% V23 = I3*R3
% I3 = V23/R3
% These relationships are true because the voltage across the parallel
% combination is the same for each side, so it can be used to find the
% current on each side of that combination with the known resistances.
for i = 1:3
Vpower = input('Enter the power supply voltage (V): ');
R1 = input('Enter the resistance of R1 (in ohms): ');
R2 = input('Enter the resistance of R2 (in ohms): ');
R3 = input('Enter the resistance of R3 (in ohms): ');
Req = R1 + (1/R2 + 1/R3)^-1;
I1 = Vpower/Req;
V23 = Vpower - I1*R1;
I2 = V23/R2;
I3 = V23/R3;
fprintf('For the power supply of %i V: I1 was %.2f A, I2 was %.2f A, I3 was %.2f A\n',Vpower,I1,I2,I3);
end
MATLAB Command Window Page 1
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Practice Problem 2
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Enter the power supply voltage (V): 12
Enter the resistance of R1 (in ohms): 50
Enter the resistance of R2 (in ohms): 75
Enter the resistance of R3 (in ohms): 90
For the power supply of 12 V: I1 was 0.13 A, I2 was 0.07 A, I3 was 0.06 A
Enter the power supply voltage (V): 9
Enter the resistance of R1 (in ohms): 100
Enter the resistance of R2 (in ohms): 50
Enter the resistance of R3 (in ohms): 75
For the power supply of 9 V: I1 was 0.07 A, I2 was 0.04 A, I3 was 0.03 A
Enter the power supply voltage (V): 6
Enter the resistance of R1 (in ohms): 150
Enter the resistance of R2 (in ohms): 80
Enter the resistance of R3 (in ohms): 120
For the power supply of 6 V: I1 was 0.03 A, I2 was 0.02 A, I3 was 0.01 A
>>
Problem 3: Solution

clear
close all
clc
disp('Urban Meyer, Seat #01');
disp('ENGR 1181');
disp('Practice Problem 3');
disp('AU 14 Prof: Woody Hayes');
disp('11/4/14');
g = 9.81;
p = 1.29;
for i = 1:4
    m = input('Enter the object''s mass: ');
    Cd = input('Enter the drag coefficient of the object: ');
    A = input('Enter the frontal area of the object (m^2): ');
    Vt(i) = sqrt(2*m*g/(p*A*Cd));
    fprintf('For object %i: the terminal velocity was %.2f m/s \n',i,Vt(i));
end
if Vt(1) == max(Vt)
    fprintf('Object #1 had the maximum terminal velocity of %.2f m/s \n',Vt(1));
elseif Vt(2) == max(Vt)
    fprintf('Object #2 had the maximum terminal velocity of %.2f m/s \n',Vt(2));
elseif Vt(3) == max(Vt)
    fprintf('Object #3 had the maximum terminal velocity of %.2f m/s \n',Vt(3));
else
    fprintf('Object #4 had the maximum terminal velocity of %.2f m/s \n',Vt(4));
end

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Practice Problem 3
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Enter the object's mass: 20
Enter the drag coefficient of the object: 0.48
Enter the frontal area of the object (m^2): 0.50
For object 1: the terminal velocity was 35.60 m/s
Enter the object's mass: 40
Enter the drag coefficient of the object: 0.50
Enter the frontal area of the object (m^2): 2.00
For object 2: the terminal velocity was 24.67 m/s
Enter the object's mass: 30
Enter the drag coefficient of the object: 0.49
Enter the frontal area of the object (m^2): 3.00
For object 3: the terminal velocity was 17.62 m/s
Enter the object's mass: 50
Enter the drag coefficient of the object: 0.39
Enter the frontal area of the object (m^2): 0.75
For object 4: the terminal velocity was 50.99 m/s
Object #4 had the maximum terminal velocity of 50.99 m/s
>>
Problem 4: Solution

clear
close all
clc
disp('Urban Meyer, Seat #01');
disp('ENGR 1181');
disp('Practice Problem 4');
disp('AU 14 Prof: Woody Hayes');
disp('11/4/14');
t = linspace(0,0.5,1000);
C1 = 850;
E = 200e9;
k = 0;
i = 1;
while k < 1000
  k = E*t(i)^3/(3*t(i)^3+(C1+6*t(i)^3)^2-450);
i = i + 1;
end
fprintf('The minimum spring thickness required is %.4f inches producing a
spring stiffness of %.2f lb/in\n',t(i),k);

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Practice Problem 4
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The minimum spring thickness required is 0.1542 inches producing a spring stiffness of
1004.78 lb/in

1. The modulus of elasticity is defined as:

   a) The ratio of yield stress to strain ($y_s/\varepsilon$) in the plastic region.

   b) The slope of strain to stress ($\varepsilon/\sigma$) in the elastic region.

   c) The slope of stress to strain ($\sigma/\varepsilon$) in the elastic region.

   d) The ratio of stress to strain ($\sigma/\varepsilon$) in the plastic region.

   e) The slope of stress to material stiffness ($\sigma/E$) in the elastic region.
2. Write the command to create a vector, \( x \), starting at 50 and ending at 5 with values every 0.2, which displays the created vector in the command window.
\[
x = [50:-.2:5]
\]

3. What is the command to use a built-in system function to find the average of the vector \( x \) from question #1 above, assign the value to RESULT, and suppress output in the command window?
\[
RESULT = \text{mean}(x);
\]

4. If \( C = [1\ 2\ 3\ 4] \) and \( D = [7\ 8\ 9] \), what is the command to create a single row array \( x \) with the elements of \( C \) and \( D \) (afterwards \( x = [1\ 2\ 3\ 4\ 7\ 8\ 9] \))?
\[
x = [C\ D];
\]

5. Write the command to find the sine of 30°? \( \sin(30/180*\pi) \) OR \( \sin(30) \);

6. The Solar Meter Lab used a Trim Pot (Trim Potentiometer) in the breadboard setup. When you turn the knob on the TrimPot, which variable is adjusted?
Resistance

7. Given that \( x=[1\ 2\ 3\ 4;\ 5\ 6\ 7\ 8;\ 9\ 10\ 11\ 12] \) has been assigned, what would be the result of \( y=x(2:3,[1\ 2\ 4]) \)?
\[
y = [5\ 6\ 8\ 9\ 10\ 12]
\]

8. Write a single statement that prompts the user with 'Please enter the day of the week: ' Assign the results to a variable called 'today', suppressing any outputs to Command Window.
\[
today = \text{input('Please enter the day of the week: ','s')};
\]

9. Given a 10 by 3 matrix M, write a single command that extracts all members of the 3rd column of matrix M and assigns it to a vector called M_col_3 using the colon operator.
\[
M_{\text{col}\_3} = M(:,3);
\]

10. A vector \( x \) is defined in MATLAB by: \( x = [1:2:7] \);
Consider the equation: \( y = \frac{x^2}{x+3} \)
Write a MATLAB command that creates a vector \( y \) where each element has a value calculated by the equation with the corresponding element in the vector \( x \).
\[
y = x.^2./(x+3);
\]