CS368 Spring 2019
Homework Assignment 2

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Problem 1: Creating a tip table

Create and display a matrix with four columns:

- column 1 contains bill totals from $5 to $100 in increments of $5
- column 2 contains the tip amount if the tip is 15% of the bill
- column 3 contains the tip amount if the tip is 18% of the bill
- column 4 contains the tip amount if the tip is 20% of the bill

```
clear
format bank  % this will format money values nicely

% Add bill values
billTotals = [5:5:100];

% Calculate tips accordingly
fifteenP = billTotals * .15;
eighteenP = billTotals * .18;
twentyP = billTotals * .2;

% Create matrix
p1 = [billTotals; fifteenP; eighteenP; twentyP]'


format short % change formatting back to default setting


p1 =

          5.00          0.75          0.90          1.00
         10.00          1.50          1.80          2.00
         15.00          2.25          2.70          3.00
         20.00          3.00          3.60          4.00
         25.00          3.75          4.50          5.00
```

```
 30.00    4.50    5.40    6.00
 35.00    5.25    6.30    7.00
 40.00    6.00    7.20    8.00
 45.00    6.75    8.10    9.00
 50.00    7.50    9.00   10.00
 55.00    8.25    9.90   11.00
 60.00    9.00   10.80   12.00
 65.00    9.75   11.70   13.00
 70.00   10.50   12.60   14.00
 75.00   11.25   13.50   15.00
 80.00   12.00   14.40   16.00
 85.00   12.75   15.30   17.00
 90.00   13.50   16.20   18.00
 95.00   14.25   17.10   19.00
100.00   15.00   18.00   20.00
```

Problem 2: Density of freshwater

Compute the density of freshwater given a temperature in F (temps)

- First we convert the temperatures to C (cels)
- Then we use the given equation (d = 5.5289×10^-8 TC^3 - 8.5016×10^-6 TC^2 + 6.5622×10^-5 TC + 0.99987) to compute the densities (dens)
- Finally we create the strings to be displayed (p2a, p2b, p2c)

```
temps = [40, 68, 100];

% Convert F to C
cels = (5/9) * (temps - 32);

% Calculate density
dens = (5.5289 * 10.^-8) * (cels.^3) - (8.5016 * 10.^-6) * (cels.^2) +
 (6.5622 * 10.^-5) * cels + .99987;

% Create strings
p2a = ['Freshwater density is ', num2str(dens(1)), ' at ',
 num2str(temps(1)), ' F'];
p2b = ['Freshwater density is ', num2str(dens(2)), ' at ',
 num2str(temps(2)), ' F'];
p2c = ['Freshwater density is ', num2str(dens(3)), ' at ',
 num2str(temps(3)), ' F'];

% Display strings
disp(p2a)
disp(p2b)
disp(p2c)
```

```
Freshwater density is 1 at 40 F
Freshwater density is 0.99822 at 68 F
Freshwater density is 0.9932 at 100 F
```

Problem 3: Distance to horizon

Plot the distance to the horizon vs hill heights on both Earth and Mars

- First we compute the radius of each planet (planetRad) given their diameters
- Then we create a vector for the range of hill heights from 0 to 10000 (hillHeights)
- Then we compute the distance to the horizon using the given equation (d = sqrt(2rh + h^2) (planet2horizon)
- Finally we plot both relationships and add styling

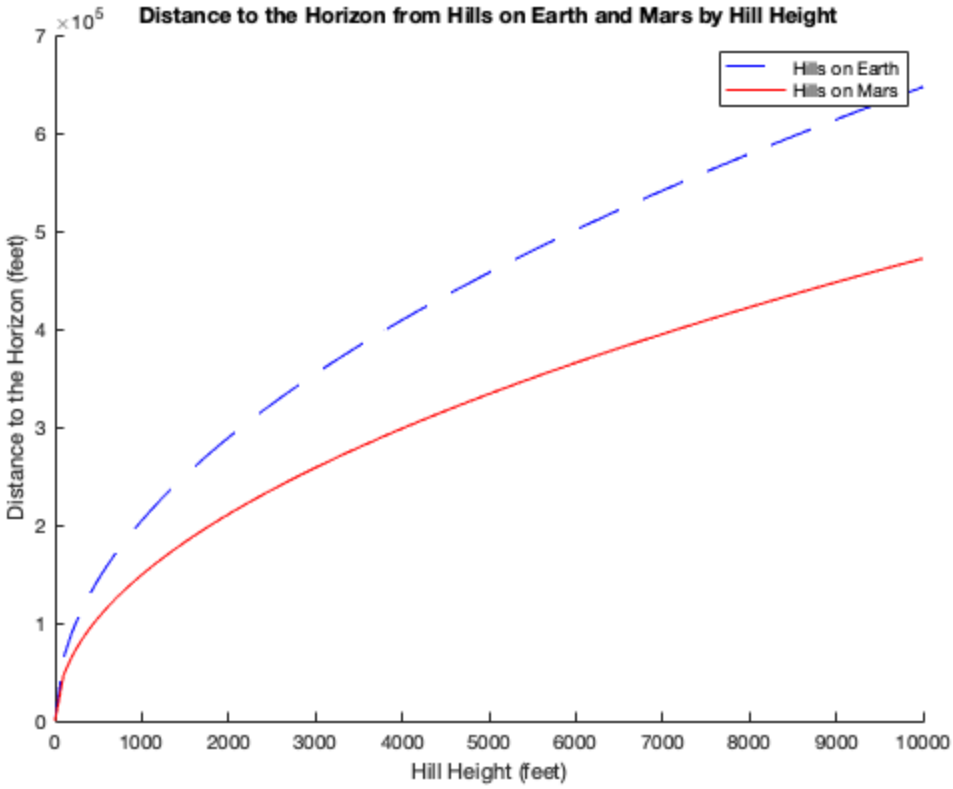
```
% Calculate radii for each planet
earthRad = 7926 * 5280 / 2;
marsRad = 4217 * 5280 / 2;

% Create vector of hill heights
hillHeights = [0:100:10000];

% Calculate distances to the horizons
earth2horizon = ((2*earthRad*hillHeights) + hillHeights.^2).^.5;
mars2horizon = ((2*marsRad*hillHeights) + hillHeights.^2).^.5;

% Plot and add styling
clf
hold on
plot(hillHeights, earth2horizon, 'b--')
plot(hillHeights, mars2horizon, 'r-')
title('Distance to the Horizon from Hills on Earth and Mars by Hill
 Height')
xlabel('Hill Height (feet)')
ylabel('Distance to the Horizon (feet)')
legend('Hills on Earth','Hills on Mars')
hold off

% End
```



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