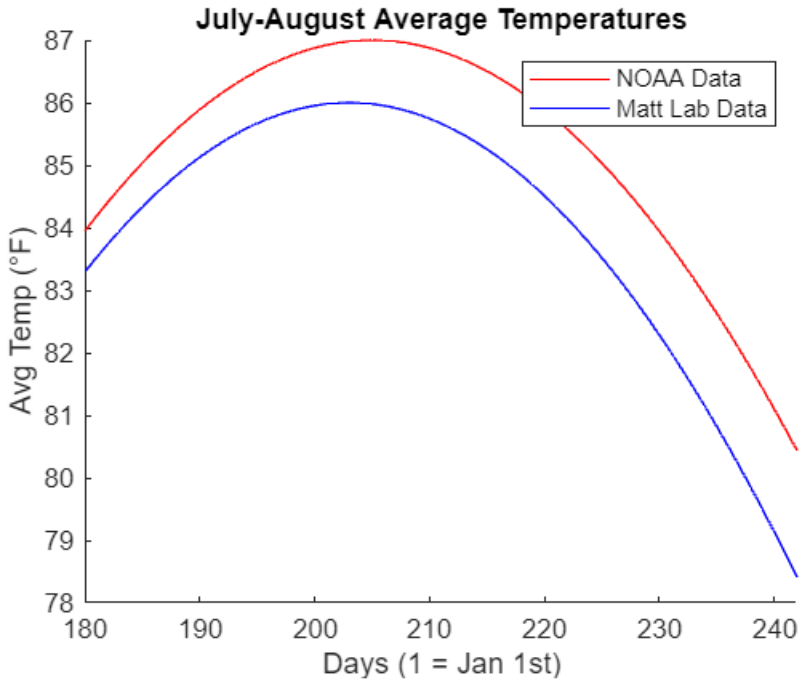
Zachary Rohloff
Homework 1 – ME 2004

MLB – 004

```
%Program Wide Stuff

t = 1:1:365;
w = 2*pi/365;
% NOAA's Data
noaadatai = readmatrix("NOAA Data.csv");
noaadata = noaadatai(:,4);
Tm1 = mean(noaadata)
[Tp1 , tp1] = max(noaadata)
T1 = Tm1 + (Tp1 - Tm1)*cos(w*(t-tp1));
% Matt Lab's Data
Tm2 = 51
Tp2 = 86
tp2 = 203
%Calculating Daily Temp
T2 = Tm2 + (Tp2 - Tm2)*cos(w*(t-tp2));
% Plotting the temps
hold 'on'
plot(t,T1,"r")
plot(t,T2,"b")
xlim ([180 242])
hold 'off'
legend("NOAA Data","Matt Lab Data")
xlabel('Days (1 = Jan 1st)')
ylabel("Avg Temp (°F)")
title("July-August Average Temperatures")
% July to August (t = 180 to 242)
```

```
Tm1 = 53.5014
Tp1 = 87
tp1 = 205
Tm2 = 51
Tp2 = 86
tp2 = 203
```



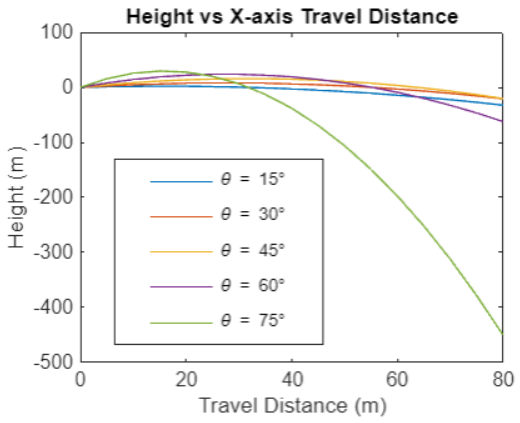
The discrepancy between the Matt Lab Data collected and the NOAA data collected could be due to a variety of factors. Some of these possible factors represent additional sources of error due to the nature of how Matt Lab was collecting his data compared to NOAA and others are inherent to comparing measurements made on 2 different machines.

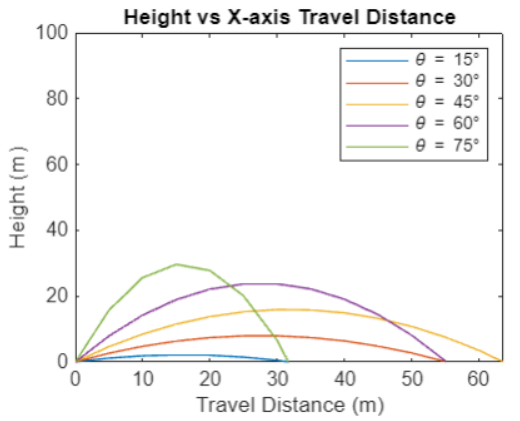
- The homemade thermometer could be im-properly calibrated
- The measurements could have been taken at slightly different locations
- The wind at the NOAA Data collection site could have been different (airports have a lot of turbulent hard to predict air that could influence an amateur's readings)

MLB – 005

```
% Reset Workspace from Part 1
clc
clear
% Set Vectors & Given Starting Values
x = 0:5:80;
theta = 15:15:75;
ynaught = 0;
```

```
vnaught = 25;
g = 9.81;
% Calculate the height matrix
y = ((tand(theta)'.*x) - ((g*x.^2)./(2*(vnaught^2)*(cosd(theta)'.^2))+ynaught));
% Plot y vs x for all theta without the y >0 constraint
plot(x,y)
title('Height vs X-axis Travel Distance')
ylabel("Height (m)")
xlabel("Travel Distance (m)")
legend(["\theta = 15°", "\theta = 30°", "\theta = 45°", "\theta = 60°", "\theta =
75°"], "Position", [0.2014 0.1747 0.3782, 0.4469])
% Plot y vs x for all theta with the y >0 constraint
plot(x,y)
title('Height vs X-axis Travel Distance')
ylabel("Height (m)")
xlabel("Travel Distance (m)")
legend("\theta = 15°", "\theta = 30°", "\theta = 45°", "\theta = 60°", "\theta =
75°")
currentylim = ylim;
ylim([0 currentylim(2)])
% Find y at theta = 60 and x = 30
y_4_7 = y(4,7)
```



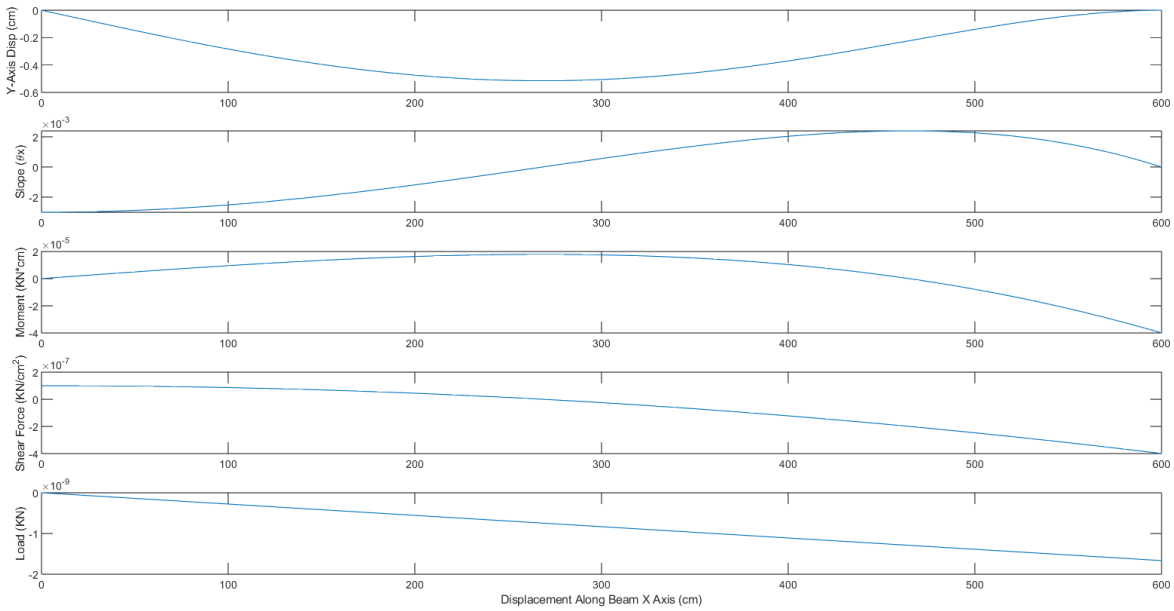



```
y_30_60deg = 23.7087
```

Launch angles of 15 and 75, as well as 30 and 60 each within their pair produce the same end travel distance. The angle of 45 produces the furthest range. Both statements make sense with basic knowledge of physics.

MLB – 010

```
% Reset Workspace from Parts 1 & 2
clc
clear
% Set up constants and givens
L = 600;
I = 30000;
E = 50000;
w = 2.5;
x = 0:10:L;
% Define C as the constants in front of the y function to simpilify calcs
C = w/(120*E*I*L);
% Calculate y
y = C*((-x.^5)+(2*(L^2).*(x.^3))-((L^4).*x));
% Calculate slope
thetax = C*((-5*x.^4)+(6*(L^2).*(x.^2))-(L^4));
% Calculate moment
moment =  C*((-20*x.^3)+(12*(L^2).*(x)));
% Calculate shear
shear =  C*((-60*x.^2)+(12*(L^2)));
% Calculate loading
loading =  C*(-120*x);
% Plot all calculated stuff
subplot(5,1,1)
plot(x,y)
ylabel('Y-Axis Disp (cm)')
subplot(5,1,2)
plot(x,thetax)
ylabel('Slope (\thetax)')
subplot(5,1,3)
plot(x,moment)
ylabel('Moment (KN*cm)')
subplot(5,1,4)
plot(x,shear)
ylabel('Shear Force (KN/cm^2)')
subplot(5,1,5)
plot(x,loading)
ylabel('Load (KN)')
xlabel('Displacement Along Beam X Axis (cm)')
% Find min abs moment
absloute =abs(moment);
[shouldbezero , positionindex] = min(absloute)
```



As shown in the graphs and the code the moment on the beam is smallest at x=0 where the absolute moment is also zero. This is also true somewhere between 460 and 470 cm down the beam. The moment starting at zero makes sense to me since the beam is progressively loaded, however the zero in the middle does not make sense to me.