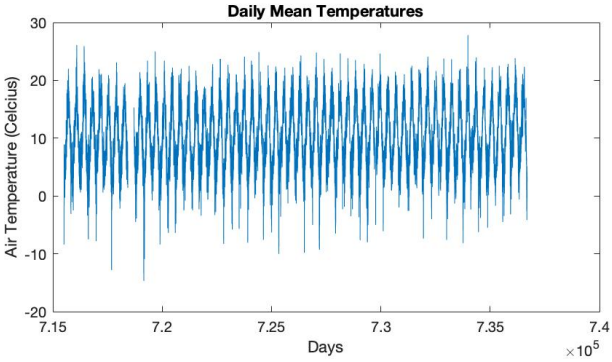
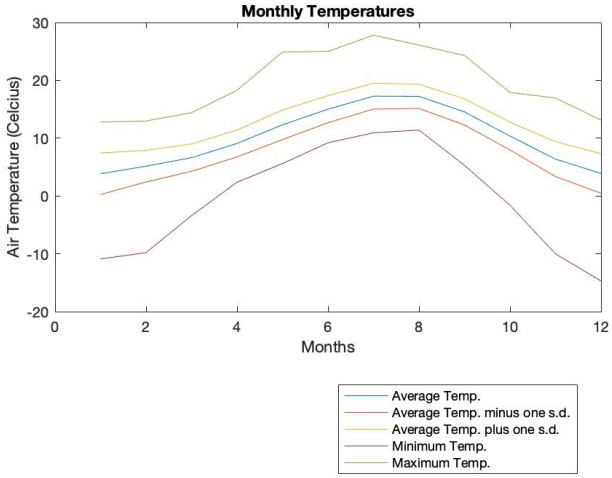
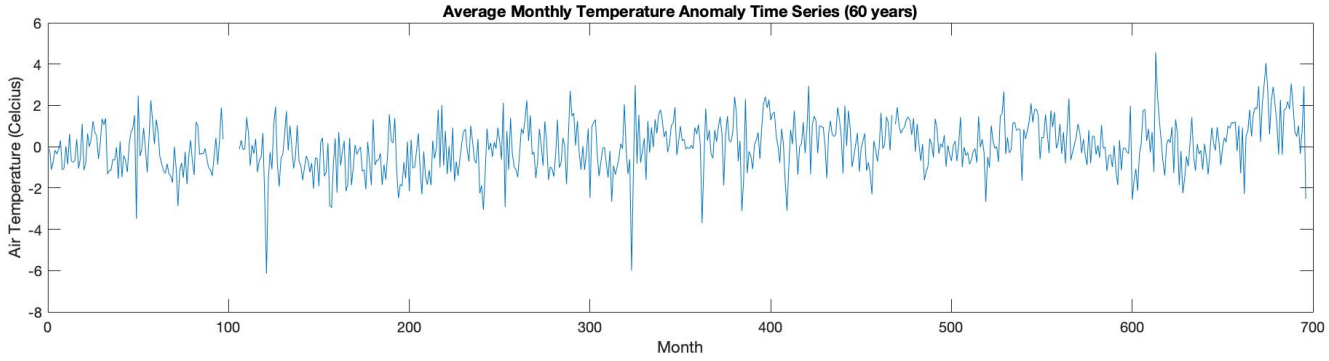
```
% Lab 2
clear

[num text all]=xlsread('airtemp.xlsx');
TairAvgDaily = num(:,2);
temporary_data = num(:,2);
% filter out the header row of 'text'
Date = text(2:end, 1);
% convert datevectors [yyy mm dd ...] to computer-readable data
Date = datenum(Date);
% 1) temp_date vs temp_data graph plotted
dates = 1:21185;
dates = dates(:);
figure(1);
subplot(3,2,1)
plot(dates, TairAvgDaily);
title('Daily Mean Temperatures')
xlabel('Days')
ylabel('Air Temperature (Celsius)')

% date in vector format
dv = datevec(Date);
% years data
year_col = dv(:,1);
% months data
month = dv(:,2);

% 2) Monthly averages, standard deviation, Min, and Max
avg_monthly_temp = [];
avg_monthly_std = [];
monthly_max = [];
monthly_min = [];
for n = 1:12
    mask = (month == n);
    avg_monthly_temp(n) = nanmean(TairAvgDaily(mask));
    avg_monthly_std(n) = nanstd(TairAvgDaily(mask));
    monthly_max(n) = max(TairAvgDaily(mask));
    monthly_min(n) = min(TairAvgDaily(mask));
end
% Create a month vector
months = 1:12;
% Plotting the five curves:
%figure(2);
subplot(3,2,2)
plot(months, avg_monthly_temp);
title('Monthly Average Temperatures')
xlabel('Months')
ylabel('Air Temperature (Celsius)')
hold on
% 2. The average temperature minus one s.d.
plot(months,avg_monthly_temp - avg_monthly_std);
% 3. The average temperature plus one s.d.
plot(months,avg_monthly_temp + avg_monthly_std);
% 4. The minimum temperature
plot(months, monthly_min);
% 5. The maximum temperature
plot(months, monthly_max);
% create legend
```

```
legend('Average Temp.','Average Temp - σ', 'Average Temp + σ', 'Minimum Temp.', 'Maximum↙
Temp.')
hold off

% Create a monthly time-series
% 3) Monthly mean temperature
avg_temp_monthly = [];
% number of months counter
n = 0;
for yr = 1959:2016
    for m = 1:12
        mask1 = (year_col == yr);
        mask2 = (month == m);
        mask = mask1&mask2;
        n = n+1;
        avg_temp_monthly(n) = nanmean(TairAvgDaily(mask));
    end
end
% Dataset has a total of 144 months
% Find how many months in avg_temp_monthly:
sz = size(avg_temp_monthly,2);
months = 1:sz;

% 4) Monthly Temperature Anomaly Time Series
avg_temp_monthly_anom = [];
% number of months counter
n = 0;
for yr = 1959:2016
    for m = 1:12
        mask1 = (year_col == yr);
        mask2 = (month == m);
        % find the overlapping of the two masks
        mask = mask1&mask2;
        n = n+1;
        % When the average is NaN, set datapoint to NaN
        if avg_temp_monthly(n) == NaN
            avg_temp_monthly_anom(n) = NaN;
        else
            % This month's average minus the monthly average
            avg_temp_monthly_anom(n) = nanmean(TairAvgDaily(mask))-avg_monthly_temp(m);
        end
    end
end
% Create plot for Average Monthly Temperature Anomalies
% figure(3);
subplot(3,1,3)
plot(months, avg_temp_monthly_anom);
title('Average Monthly Temperature Anomaly Time Series (1959 - 2016)')
xlabel('Month')
ylabel('Air Temperature (Celsius)')
```


Daily Mean Temperatures
Air Temperature (Celcius)
Days
×10^5


Monthly Temperatures
Air Temperature (Celcius)
Months
Average Temp.
Average Temp. minus one s.d.
Average Temp. plus one s.d.
Minimum Temp.
Maximum Temp.


Average Monthly Temperature Anomaly Time Series (60 years)
Air Temperature (Celcius)
Month

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30515167

Lab 2: Lab Worksheet

Don't forget to write your name, student number, and group number at the top of this page.

Question 1

Using the figure characterizing the seasonal cycle, describe our local climate using specific information from your data (i.e.min, max, ranges).

The original dataset has daily average temperatures spanning from January 1st 1959 to December 31st 2016. The figure characterizing the seasonal cycle has the domain Months from 1 to 12, and range Air Temperature (Celsius) from about -15 to 28. It appears to be the warmest during mid July with max temperature at 28 degrees Celsius and min temperature at 10 degrees Celsius. It is the coldest around December, with max temperature at 12 degrees Celsius and min temperature at -14 degrees Celsius.

Question 2

Compare the monthly mean, min and max air temperature with the climate statistics published by Environment Canada. How well do your calculated values match Environment Canada's?

My calculated values matches the Environment Canada's values quite well, the monthly mean, min and max air temperature are closely related.

Question 3

Can you see any trend in the monthly temperature anomaly? Does it surprise you? What type of plot, or analyses, would you do to enhance a trend or the absence of a trend?

There is a slight upward trend in the monthly temperature anomaly from 1959 to 2016. There are oscillation for every few repeating months, and once in a while there is an outlier.

Question 4

What are the main factors that could control temperature anomalies in Vancouver? What type of plot or analyses would you do to show that there is an actual relationship between these controls and temperature anomalies?

The station location or elevation will have an effect on the data. The anomaly could be affected by CO_2 contents in the air. During the COVID lockedown there may be less cars on the road, so less CO_2 than usual.