```matlab
% Lab 3
clear
% loading the data for this lab
data=xlsread('lab3_data.xlsx');
% Create a vector of monthly dates
dates = data(:,1);

% ***** Section 1 *****

% Create vectors for variables:
UBC_avg_temp_monthly_anom = data(:,2);
CRU_avg_temp_monthly_anom = data(:,3);
TSI_time_series = data(:,4);
AOD = data(:,5);
Atmos_CO2_concentration = data(:,6);
Anthro_SO2_emissions = data(:,7);
MEI = data(:,8);

% Plot each times series in subplots
subplot(4,2,1);
plot(dates, UBC_avg_temp_monthly_anom);
title('UBC temperature anomaly (1961 - 2016)')
xlabel('Years')
ylabel('Air Temperature (Celsius)')
[b,bint,r,rint,stats]=regress(UBC_avg_temp_monthly_anom,[ones(size↙
(UBC_avg_temp_monthly_anom)) dates]);
MeanTemp1 = b(2)*dates + b(1);
hold on
plot(dates,MeanTemp1,'r')
%include lengend...

subplot(4,2,2);
plot(dates, CRU_avg_temp_monthly_anom);
title('Global Mean Temperature Anomaly (1950 - 2016)')
xlabel('Years')
ylabel('Air Temperature (Celsius)')
[b,bint,r,rint,stats]=regress(CRU_avg_temp_monthly_anom,[ones(size↙
(CRU_avg_temp_monthly_anom)) dates]);
MeanTemp2 = b(2)*dates + b(1);
hold on
plot(dates,MeanTemp2,'r')
%...

subplot(4,2,3);
plot(dates, TSI_time_series);
title('Total Solar Irradiance (TSI) (1950 - 2016)')
xlabel('Years')
ylabel('Solar Energy (W/m^2)')
%...

subplot(4,2,4);
plot(dates, AOD);
title('Global Mean Stratospheric Aerosol Optical Depth (AOD) (1950 - 2016)')
xlabel('Years')
ylabel('Aerosol Optical Depth')
%...

subplot(4,2,5);
```

```matlab
plot(dates, Atmos_CO2_concentration);
title('Atmospheric CO2 concentration (1950 - 2016)')
xlabel('Years')
ylabel('Atmospheric CO2 Concentration (ppm)')
%...

subplot(4,2,6);
plot(dates, Anthro_SO2_emissions);
title('Anthropogenic SO2 Emissions (1950 - 2016)')
xlabel('Years')
ylabel('Anthropogenic SO2 Emissions (Tg/year)')
%...

subplot(4,2,7);
plot(dates, MEI);
title('Multivariat ENSO Index (MEI) (1950 - 2016)')
xlabel('Years')
ylabel('Multivariat ENSO Index')
%...

% Display Histograms
figure(2)
subplot(2,1,1)
histogram(UBC_avg_temp_monthly_anom(1:384),linspace(min(UBC_avg_temp_monthly_anom),max↙
(UBC_avg_temp_monthly_anom),35),'Normalization','probability')
hold on
histogram(UBC_avg_temp_monthly_anom(385:804),linspace(min(UBC_avg_temp_monthly_anom),max↙
(UBC_avg_temp_monthly_anom),35),'Normalization','probability')
title('Frequency of UBC Temperature Anomaly 1950-1985 and 1985-2016')
xlabel('UBC Temperature Anomoly (C)')
ylabel('Frequency of Occurrence')
legend('1950-1985','1986-2016')

subplot(2,1,2)
histogram(CRU_avg_temp_monthly_anom(1:384),linspace(min(CRU_avg_temp_monthly_anom),max↙
(CRU_avg_temp_monthly_anom),35),'Normalization','probability')
hold on
histogram(CRU_avg_temp_monthly_anom(385:804),linspace(min(CRU_avg_temp_monthly_anom),max↙
(CRU_avg_temp_monthly_anom),35),'Normalization','probability')
title('Frequency of Global Mean Temperature Anomaly 1950-1985 and 1985-2016')
xlabel('Global Mean Temperature Anomoly (C)')
ylabel('Frequency of Occurrence')
legend('1950-1985','1986-2016')

% ***** Section 2 *****
% Answer on Lab3 worksheet

% ***** Section 3 *****
% Plot UBC temperature anomaly vs Global Mean Temperature Anomaly
figure(3)
scatter(UBC_avg_temp_monthly_anom, CRU_avg_temp_monthly_anom, 'ko')
title('UBC Temperature Anomaly and Global Mean Temperature Anomaly Scatter Plot from↙
1950-2016')
xlabel('UBC Temperature Anomaly (C)')
ylabel('Global Mean Temperature Anomaly (C)')
stats = regstats(UBC_avg_temp_monthly_anom,CRU_avg_temp_monthly_anom);

% ***** Section 4 *****
```

```matlab
% Perform regression of Global Mean Temp against TSI, AOD, CO2, SO2 and MEI
% Which variable is there a large confidence on the sign of the linear
% regression slope?

% Plot Global Mean Temperature anomaly vs MEI and UBC Temperature Anomaly vs MEI
% Perform linear regression for each pair; add regression line and slope
figure(4)
subplot(2,1,1)
mlr = fitlm(MEI,UBC_avg_temp_monthly_anom);
plot(mlr)
title('UBC Temperature Anomaly vs MEI 1950-2016')
xlabel('MEI')
ylabel('UBC Temperature Anomaly (C)')

subplot(2,1,2)
mlr = fitlm(MEI,CRU_avg_temp_monthly_anom);
plot(mlr)
%{
This code also works but NOT using it:
scatter(MEI,CRU_avg_temp_monthly_anom,'kx')
[b,bint,r,rint,stats] = regress(CRU_avg_temp_monthly_anom,[ones(size↙
(CRU_avg_temp_monthly_anom)) MEI]);
RegCRU = b(2)*MEI+b(1);
hold on
plot(MEI,RegCRU,'r')
%}
title('Global Mean Temperature Anomaly vs MEI 1950-2016')
xlabel('MEI')
ylabel('Global Mean Temperature Anomaly (C)')

% ***** Section 5 *****

% 5 Forcing variables: TSI, AOD, CO2, SO2 and MEI
% Multilinear regression of Global Mean Temperature Anomaly against the 5 variables
figure(5)
x = [TSI_time_series, AOD, Atmos_CO2_concentration, Anthro_SO2_emissions, MEI];
mlr = fitlm(x,CRU_avg_temp_monthly_anom);
plot(mlr)
title('Predicted Temperature from Five Explanatory Variables 1950-2016')
xlabel('5 Explanatory Variables (TSI, AOD, CO2, SO2, MEI)')
ylabel('Global Mean Temperature Anomaly (C)')
```