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Implementation 3 Report:

Part 1:

a. *The linear program for the general problem written as an objective and set of constraints*

Minimum m (Max abs deviation)

Subject To:

m >= 0 // we only need positive maxes from an absolute value

m >= -(x* a + b - y)

m >= (x* a + b - y)

B. *The best solution for the specific problem above*

solver objective: 0.57142857

Val of a: 1.7142857

Val of b: 1.8571429

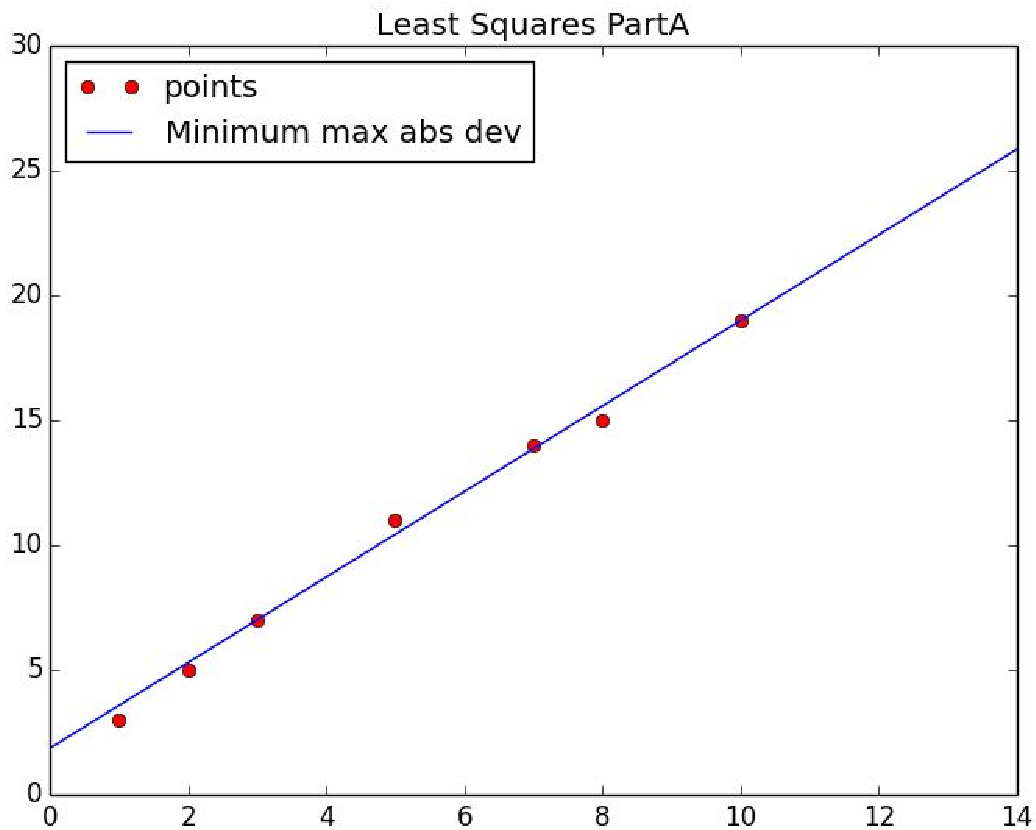
C. *The output of the LP solver that you used (showing that an optimal solution was found)*

Val of a: 1.7142857

Val of b: 1.8571429

SOLUTION: y = 1.7142857x + 1.8571429

D. *A plot of the points and your solution for the instance*



Part 2:

a. *A description for a linear program for finding the best fit curve for temperature data.*

Minimum m(Max abs dev):

Subject to:

m >= 0 // we only need the positive values from the absolute value

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m >= -(x + (x1 * d) + (x2 * math.cos((2 * math.pi * d) / 365.25)) + (x3 * math.sin((2 * math.pi * d) / 365.25)) + (x4 * math.cos((2 * math.pi * d) / (365.25 * 10.7))) + (x5 * math.sin((2 * math.pi * d) / (365.25 * 10.7))) - T(d))

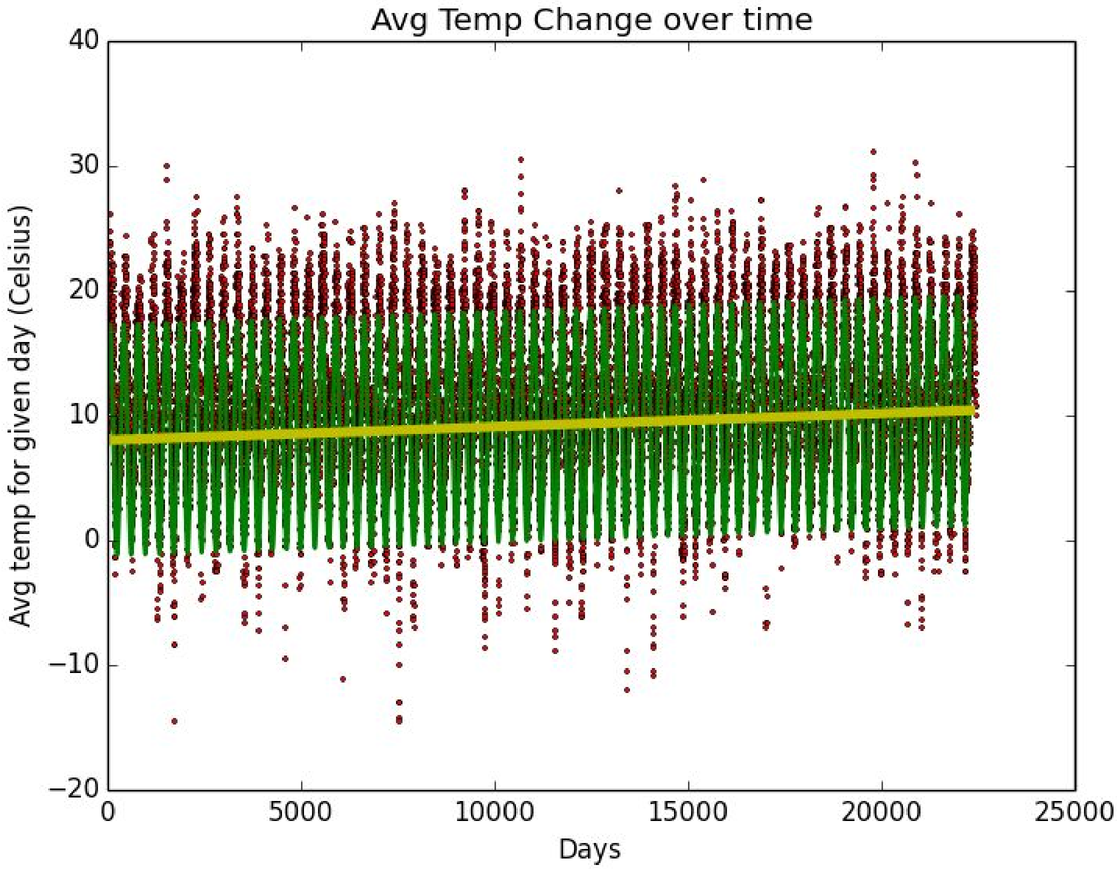
m >= (x + (x1 * d) + (x2 * math.cos((2 * math.pi * d) / 365.25)) + (x3 * math.sin((2 * math.pi * d) / 365.25)) + (x4 * math.cos((2 * math.pi * d) / (365.25 * 10.7))) + (x5 * math.sin((2 * math.pi * d) / (365.25 * 10.7))) - T(d))
```

B. *The values of all of the variables to your linear program in the optimal solution that your linear program solver finds for the Corvallis data. Solving this LP may take a while depending on your computer. Be patient. Include the output of the LP solver that you use (showing that an optimal solution was found)*

Values(For raw data):

Solver: 14.23554
Val of x: 8.0214197
Val of x1/slope: 0.00010694836
Val of x2: 4.2808907
Val of x3: 8.1868578
Val of x4: -0.79063079
Val of x5: -0.29536021

C.



D. x1 is the slope of temperature increase by day for the raw data.

So x1 * 365 * 100 = **3.9036151400000003 degrees per century**.. But!

To find the line of best fit for the data:

M = 4.0334403880277316e-05

B = 10.869131808331797

So,

Change of average temperature over the data period for **line of best fit** is

Y = M* 22305 + B

Which comes out to 11.768658792

Then 11.76 - 10.86 = 0.9 degree difference over the course of 50 years in this case

Which is indeed a warming trend

e. Repeat b-d for SF

I. Values(For raw data):

Solver: 23.178256

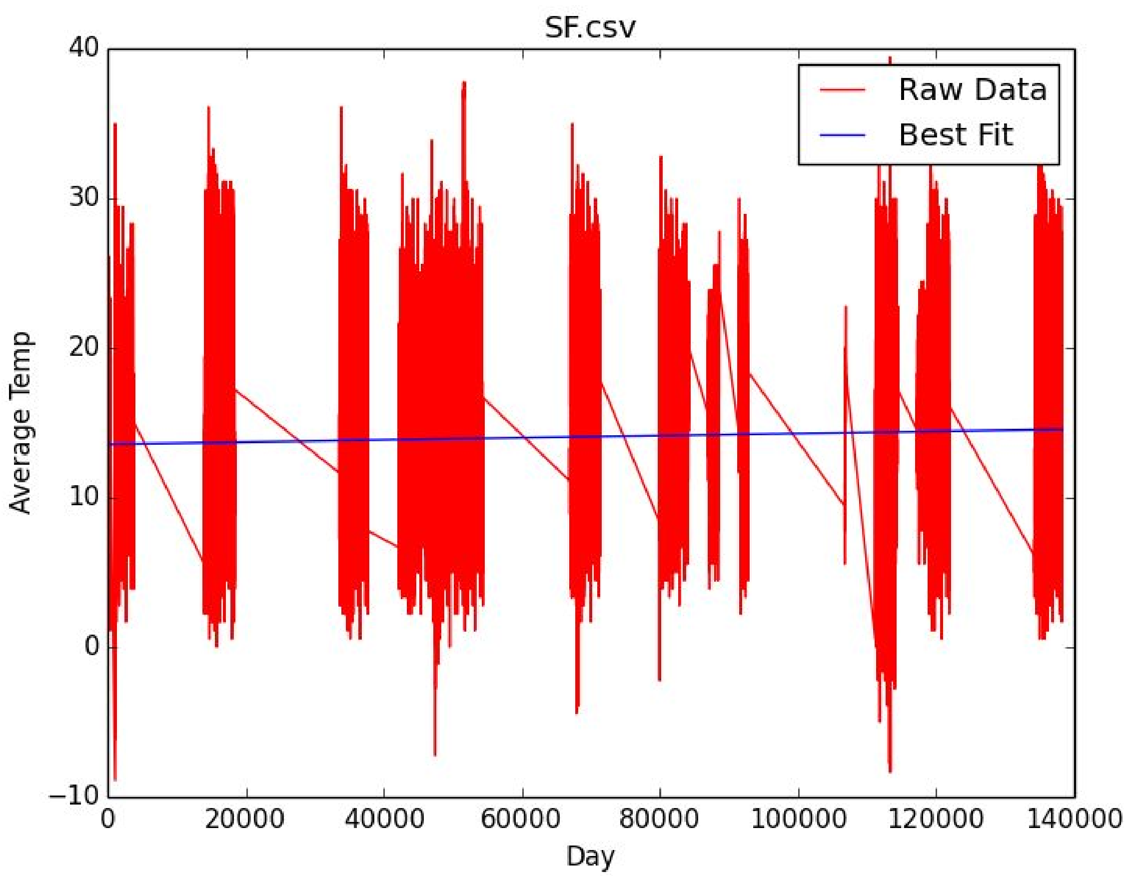
Val of x: 15.114899

Val of x1/slope: -4.6730411e-06
Val of x2: -1.6643722
Val of x3: 2.4138607
Val of x4: -0.88761774
Val of x5: -0.53528776

Line of best fit data:
M = 7.2151379710181921e-06
B = 13.562575584085966
Y = M * 47795 + B
Y = 13.90742310341078

So, there is a change of 0.34484751932481394 degree difference, but what is interesting with this data is that it is only over the past 12 years. ***Which is a warming trend still.***

II.



III. 0.34484751932481394 degree difference over 12 years so 0.028737293 degree change on average per year. This * 100 =2.873729328 degree change in a century.

No sinusoidal data since the discontinuity in the years from NOAA