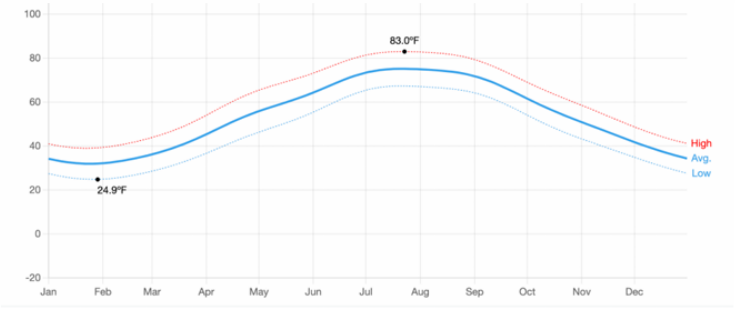
Problem Description:

Problem T1.1 (100 Points) The monthly temperature averages, along with min and max, in Stony Brook are tabulated and graphed here. To simplify the project, we assume each month has precisely 31 days and the average for a given month can be considered as the temperature of the 16th day.

Note: You need to do reasonably amount of original coding for solving this problem.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	40°F	41°F	48°F	60°F	69°F	77°F	83°F	82°F	75°F	64°F	54°F	45°F
Average	33°F	34°F	40°F	51°F	60°F	69°F	75°F	74°F	67°F	56°F	47°F	38°F
Low	26°F	26°F	32°F	42°F	51°F	61°F	67°F	66°F	60°F	49°F	39°F	31°F



Thus, I start a table of 12 data points (only showing data for four months, you do the rest):

Month	Jan	Feb	Mar	Apr	…
t (Day from Jan 1)	16+31*0	16+31*1	16+31*2	16+31*2	…
Average Temp (F)	33	34	40	51	…

Please do (60 points for (1), 20 points for each of (2) and (3)):
(1) Fit the given 12 data points in a polynomial,

$$P_3(t) = a_0 + a_1 t + a_2 t^2 + a_3 t^3$$

(2) Calculate the temperatures on June 4 and Dec. 25 with your fit.
(3) Calculate the day(s) when the temperature reaches 64.89, again, with your fit.

Method:

I fit the data points in a polynomial and find root by taking the polynomials and the target temperature using the numpy library.

Result:

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Polynomial Coefficients:                3                2
-3.991e-06 x + 0.0009577 x + 0.1871 x + 25.94
Temperature on June 4: 66.47692302997595
Temperature on Dec 25: 15.560598275209964
Days when temperature reaches 64.89: [np.float64(284.
1487347803957), np.float64(164.5667136314517)]
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(1) I got a polynomial of 25.94 + 0.1871x + 0.0009577x^2 + -3.991e-06x^3
(2) The temperature on June 4 is 66. 66.47692302997595
The temperature on Dec 25 is 15.560598275209964
(3) Days when temperature reach 64.89 is the 284th and the 164th day of the year.