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CMSC 150 -B3L

November 15, 2023

Exercise 07

Part 2.

The Balds in Us Data Mining Company gathers the number of COVID19 cases in the Philippines at the end of each month since March 2019 by scraping reports from the DOH website. Their collected data are shown in a table below:

Month	Cases as of end of Month
March	182
April	536
May	245
June	2027
July	2304

The company secretly celebrated its foundation anniversary last May 8 by having a traditional mañanita. Now, the company got curious and wanted to know how many cases were added because of their celebration. Since COVID19 test results only arrive at least two weeks after the test, they want to find out the approximate number of cases added 15 days after their celebration. As an intern of the company, your task is to help them satisfy their curiosity.

Given:

Data points for independent variable x: 31, 61, 92, 122, 153
Data points for depend variable y or f(x) : 182, 536, 245, 2027, 2304
foundation anniversary = May 8 = 61 + 8 = 69 (in days)

Asked:

Compute for the number of cases added 15 days after their celebration
(May 8th + 15 days = May 23rd)
OR
Compute for f(x) given that x = 69 + 15 = 84

Solution:

Using Neville's Algorithm

In R:

```
# Part 2.
# data points for x
end_of_march = 31
end_of_april = 30 + end_of_march
end_of_may = 31 + end_of_april
end_of_june = 30 + end_of_may
end_of_july = 31 + end_of_june
days = c(end_of_march, end_of_april, end_of_may, end_of_june, end_of_july)
# data points for f(x) or y
cases = c(182, 536, 245, 2027, 2304)
```

Solving for f(84):

```
# 15 days after the celebration = May 8th + 15 days = May 23rd
x = end_of_april+8+15
y = Neville(x, list(days, cases))
```

Results:

```
> y
$table
     Pi,i    Pi,i+1    Pi,i+2    Pi,i+3   Pi,i+4
[1,]  245  320.0968  112.6078  225.9387 112.1596
[2,]  536 1098.1803  976.7556 1093.5044   0.0000
[3,] 2027 1256.5604 1443.7509    0.0000   0.0000
[4,]  182 1103.8525    0.0000    0.0000   0.0000
[5,] 2304    0.0000    0.0000    0.0000   0.0000

$y
  Pi,i+4
112.1596
```

Given a set of five xy-paired data points, f(84) at 4th order interpolating polynomial (using Neville's algorithm) is equal to 112.1596.

Interpretation: The approximate number of cases added 15 days after The Balds in Us Data Mining Company's foundation anniversary celebration on May 23rd is 112.