CSE108 – Computer Programming Laboratory
Lab #6

Date: Monday
March 18, 2019

Handin: A student with number 20180000001 should hand in three separate files named 20180000001_part1.c, 20180000001_part2.c and 20180000001_part3.c for this lab.

Part 1. [60pts] A group of friends is planning to go on a vacation. They would like to visit one of the following cities {Ankara, Istanbul, Izmir, Antalya}. Their vacation will be 5 days long. They will choose the destination based on a simple rule. For 5 days the average temperature should not be less than 20 degrees.

They would like you to write a program to help them identify the city and the dates for their vacation. They are willing to enter the weather forecast for each of the four cities for seven days. An example is given below:

Cities\Temperatures ▾	Day1 ▾	Day2 ▾	Day3 ▾	Day4 ▾	Day5 ▾	Day6 ▾	Day7 ▾
Ankara	8	12	17	19	19	17	14
İstanbul	12,5	16	19,5	18	17	12	11,5
İzmir	14	21	19	20	20	19	18
Antalya	18	21,5	21	19	20	22	21

Your program should read the forecast table and list all the possible vacation destinations and dates meeting their requirements above.

Do the following to achieve this:

a. Keep the weather forecast in a 2-dimensional array named **wf[4][7]** .

b. Implement the function **void read_forecast(float wf[4][7])** that reads the current table for 7 temperature values for 4 cities.

c. Implement the function named **void city_avr(float wf[4][7], float ave[4][3])**. Note that there are only three 5 day intervals in 7 consecutive days.

d. Implement the function named **void select_city_and_day(float ave[4][3])**. This function takes the average temperatures for all the cities for all the possible 5 day intervals and print the cities and dates meeting the minimum average temperature requirement.

If the user enters the values in the table above, **read_forecast (wf)** should return the following in **wf**:

```
8.00    12.00   17.00   19.00   19.00   17.00   14.00
12.50   16.00   19.50   18.00   17.00   12.00   11.50
14.00   21.00   19.00   20.00   20.00   19.00   18.00
18.00   21.50   21.00   19.00   20.00   22.00   21.00
```

If the user calls **city_avr(wf, ave)** with the above **wf** the function should return the following in **ave**:

15.0   16.8   17.2
16.6   16.5   15.6
18.8   19.8   19.2
19.9   20.7   20.6

For the above **ave**, the function **select_city_and_day(ave)** should print:

City 4, Days 2
City 4, Days 3

Part 2.   [40pts] The sine of an angle x can be calculated using the following Taylor series:

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \frac{x^9}{9!} - \dots$$

$$= \sum_{n=1}^{\infty} (-1)^{(n-1)} \frac{x^{2n-1}}{(2n-1)!} \stackrel{\text{or}}{=} \sum_{n=0}^{\infty} (-1)^{n} \frac{x^{2n+1}}{(2n+1)!}$$

Here x is given in radians. Implement the following function that calculates the sine of a given angle in radians.

```
double mysine(double x);
```

Using this function, write a complete program that reads an angle value from the user in degrees. It then prints the sine of the angle. Use the following formula to convert degrees to radians:

$$x * 3.14/180$$

You are not allowed to use anything from math.h library. An example run of your program should be as the following:

```
> run_my_program
Enter angle in degrees: 0.0
Sine of 0.0degrees is 1.0
```