

## Assignment 2

### Problem 1:

### Estimating the value of Pi using Monte Carlo

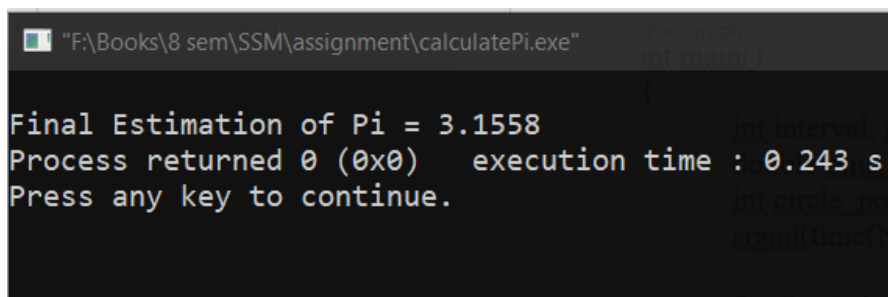
```
#include <bits/stdc++.h>
#define INTERVAL 1000
using namespace std;

int main()
{
    int interval, i;
    double rand_x, rand_y, origin_dist, pi;
    int circle_points = 0, square_points = 0;
    srand(time(NULL));

    for (i = 0; i < (INTERVAL * INTERVAL); i++) {
        rand_x = double(rand() % (INTERVAL + 1)) / INTERVAL;
        rand_y = double(rand() % (INTERVAL + 1)) / INTERVAL;
        origin_dist = rand_x * rand_x + rand_y * rand_y;
        if (origin_dist <= 1)
            circle_points++;
        square_points++;
        pi = double(4 * circle_points) / square_points;
    }

    cout << "\nFinal Estimation of Pi = " << pi;

    return 0;
}
```



```
"F:\Books\8 sem\SSM\assignment\calculatePi.exe"
Final Estimation of Pi = 3.1558
Process returned 0 (0x0)   execution time : 0.243 s
Press any key to continue.
```

**Problem 2:**

Dr. Ravi, a dentist schedules all his patients for 30 minute appointments. Some of the patients take more or less than 30 minutes depending on the type of dental work to be done. The following table shows the summary of the various categories of work, their probabilities and the time actually needed to complete the work.

| Category   | Time Required(minutes) | No. of Patients |
|------------|------------------------|-----------------|
| Filling    | 45                     | 40              |
| Crown      | 60                     | 15              |
| Cleaning   | 15                     | 15              |
| Extraction | 45                     | 10              |
| Check-up   | 15                     | 20              |

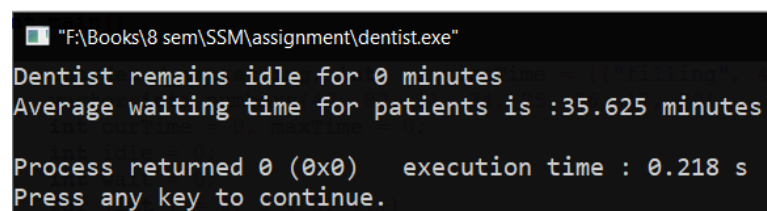
Simulate the dentist's clinic for four hours and determine the average waiting time for the patients as well as the idleness of the doctor. Assume that all the patients show up at the clinic exactly at their scheduled arrival time, starting at 8.00 am. Use the following random numbers for handling the above problem: 40, 82, 11, 34, 25, 66, 17, 79

**Code:**

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    unordered_map<string,int>
    serviceTime={ {"filling",45},{ "crown",60},{ "cleaning",15},{ "extraction",45},{ "check-
up",15} };
    vector<int> numbers{40,82,11,34,25,66,17,79};
    int curTime=0,maxTime=0;
    int idle=0;
    int wait=0;
    for(int i=0;i<8;i++)
    {
        if(curTime>maxTime)
        {
            idle+=(curTime-maxTime);
            maxTime=curTime;
        }
        wait+=(maxTime-curTime);
        curTime+=30;
        string type="";
```

```
        if(numbers[i]<40)
            type="filling";
        else if(numbers[i]<55)
            type="crown";
        else if(numbers[i]<70)
            type="cleaning";
        else if(numbers[i]<80)
            type="extraction";
        else
            type="check-up";
        maxTime+=serviceTime[type];
    }
    cout<<"Dentist remains idle for "<<idle<<" minutes\n";
    cout<<"Average waiting time for patients is : "<<((float)wait/8.0)<<" minutes\n";
    return 0;
}
```

### Output:



```
"F:\Books\8 sem\SSM\assignment\dentist.exe"
Dentist remains idle for 0 minutes
Average waiting time for patients is :35.625 minutes

Process returned 0 (0x0)   execution time : 0.218 s
Press any key to continue.
```