Lab Assignment 1
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Question:
Scheduling Algorithm(RR,SJF(preemptive&nonpreemptive),FCFS)

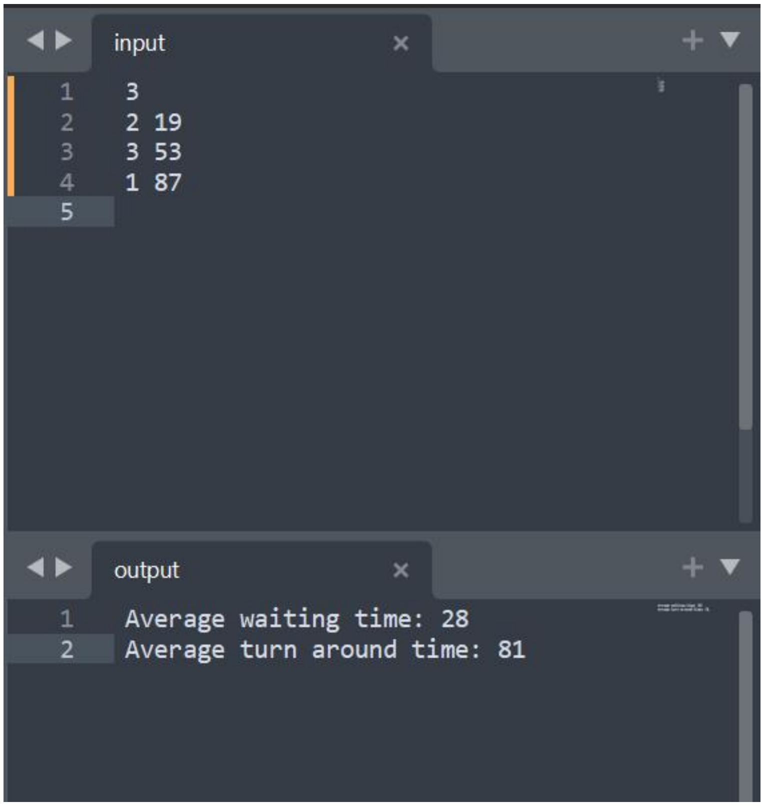
1. FCFS:

Code:

```
// Author: Chaudhary Hamdan, 1905387

#include<stdio.h>


void findWaitingTime(int processes[], int n, int bt[], int wt[])
{
        wt[0] = 0;

        for (int i = 1; i < n ; i++ )
                wt[i] = bt[i - 1] + wt[i - 1] - processes[i];
}

void findTurnAroundTime( int processes[], int n, int bt[], int wt[], int tat[])
{
        for (int i = 0; i < n ; i++)
                tat[i] = bt[i] + wt[i];
}

void findavgTime( int processes[], int n, int bt[])
{
        int wt[n], tat[n], total_wt = 0, total_tat = 0;

        findWaitingTime(processes, n, bt, wt);
```

```
    findTurnAroundTime(processes, n, bt, wt, tat);


    for (int i = 0; i < n; i++)
    {
        total_wt = total_wt + wt[i];
        total_tat = total_tat + tat[i];
    }
    int s = total_wt * 1.0 / n;
    int t = total_tat * 1.0 / n;
    printf("Average waiting time: %d", s);
    printf("\nAverage turn around time: %d ", t);
}

int main()
{
#ifndef ONLINE_JUDGE
    freopen("C:\\Users\\KIIT\\input", "r", stdin);
    freopen("C:\\Users\\KIIT\\output", "w", stdout);
#endif


    int n;
    scanf("%d", &n);

    int processes[n], burst_time[n];

    for (int i = 0; i < n ; i++) {
        scanf("%d", &processes[i]);
        scanf("%d", &burst_time[i]);
    }

    findavgTime(processes, n, burst_time);
    return 0;
}
```

Output:



```
3
2 19
3 53
1 87
```

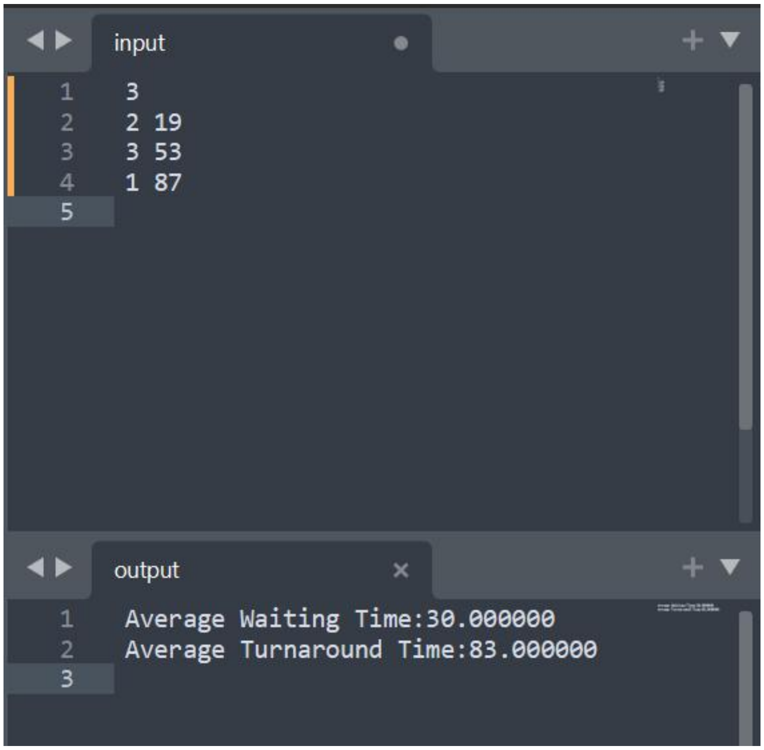
```
Average waiting time: 28
Average turn around time: 81
```

2. SJF (Preemptive)
Code:

```
// Author: Chaudhary Hamdan, 1905387

#include <stdio.h>


int main()
{
#ifndef ONLINE_JUDGE
    freopen("C:\\Users\\KIIT\\input", "r", stdin);
    freopen("C:\\Users\\KIIT\\output", "w", stdout);
#endif



    int arrival_time[10], burst_time[10], temp[10];
    int i, smallest, count = 0, time, limit;
    double wait_time = 0, turnaround_time = 0, end;
    float average_waiting_time, average_turnaround_time;
    scanf("%d", &limit);
    for (i = 0; i < limit; i++)
    {
        scanf("%d", &arrival_time[i]);
        scanf("%d", &burst_time[i]);
        temp[i] = burst_time[i];
    }
    burst_time[9] = 9999;
    for (time = 0; count < limit; time++)
    {
        smallest = 9;
        for (i = 0; i < limit; i++)
        {
            if (arrival_time[i] <= time && burst_time[i] < burst_time[smallest] && burst_time[i] > 0)
            {
                smallest = i;
            }
        }
```

```
                    burst_time[smallest]--;
                    if (burst_time[smallest] == 0)
                    {
                              count++;
                              end = time + 1;
                              wait_time = wait_time + end - arrival_time[smallest] - temp[smallest];
                              turnaround_time = turnaround_time + end - arrival_time[smallest];
                    }
          }
          average_waiting_time = wait_time / limit;
          average_turnaround_time = turnaround_time / limit;
          printf("Average Waiting Time:%lf\n", average_waiting_time);
          printf("Average Turnaround Time:%lf\n", average_turnaround_time);
          return 0;
}
```

Output:



```
3
2 19
3 53
1 87
```

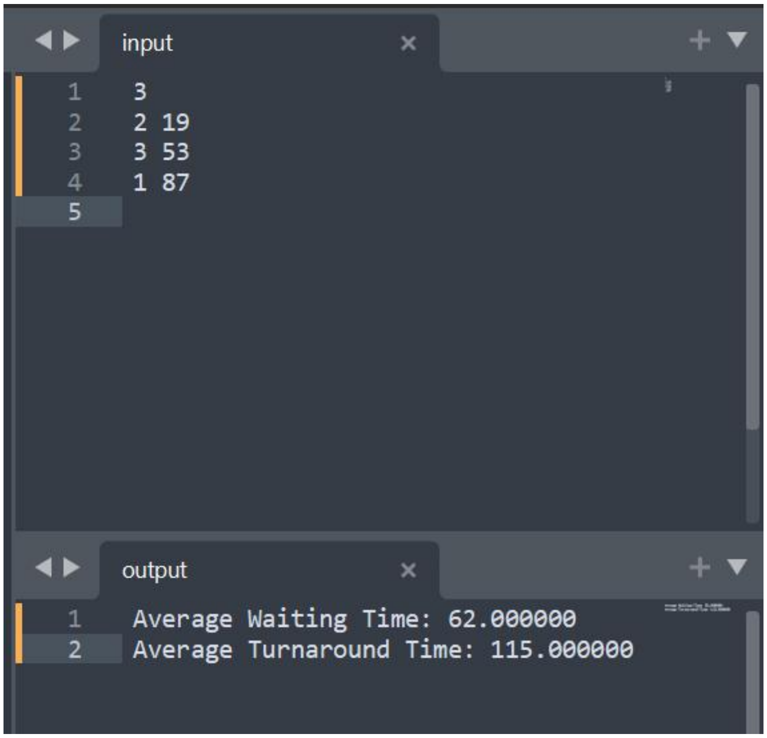
```
Average Waiting Time:30.000000
Average Turnaround Time:83.000000
```

3. Shortest Job First (Non Preemptive)

Code:

```
// Author: Chaudhary Hamdan, 1905387

#include<stdio.h>

int main()
{
#ifndef ONLINE_JUDGE
    freopen("C:\\Users\\KIIT\\input", "r", stdin);
    freopen("C:\\Users\\KIIT\\output", "w", stdout);
#endif

    int i, n, p[10] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, min, k = 1, btime = 0;
    int bt[10], temp, j, at[10], wt[10], tt[10], ta = 0, sum = 0;
    float wavg = 0, tavg = 0, tsum = 0, wsum = 0;
    scanf("%d", &n);
    for (i = 0; i < n; i++)
    {
        scanf(" %d", &at[i]);
        scanf(" %d", &bt[i]);
    }
    for (i = 0; i < n; i++)
    {
        for (j = 0; j < n; j++)
        {
            if (at[i] < at[j])
            {
                temp = p[j];
                p[j] = p[i];
                p[i] = temp;
                temp = at[j];
                at[j] = at[i];
                at[i] = temp;
                temp = bt[j];
                bt[j] = bt[i];
                bt[i] = temp;
            }
        }
    }
    for (j = 0; j < n; j++)
    {
        btime = btime + bt[j];
        min = bt[k];
        for (i = k; i < n; i++)
        {
            if (btime >= at[i] && bt[i] < min) {
                temp = p[k];
                p[k] = p[i];
                p[i] = temp;
                temp = at[k];
                at[k] = at[i];
                at[i] = temp;
                temp = bt[k];
                bt[k] = bt[i];
                bt[i] = temp;
            }
        } k++;
    }
    wt[0] = 0;
    for (i = 1; i < n; i++)
    {
        sum = sum + bt[i - 1];
        wt[i] = sum - at[i];
        wsum = wsum + wt[i];
    }
    wavg = (wsum / n);
    for (i = 0; i < n; i++)
    {
        ta = ta + bt[i];
        tt[i] = ta - at[i];
        tsum = tsum + tt[i];
    }
    tavg = (tsum / n);

    printf("Average Waiting Time: %f", wavg);
    printf("\nAverage Turnaround Time: %f", tavg);
    return 0;
}
```

Output:



```
3
2 19
3 53
1 87
```

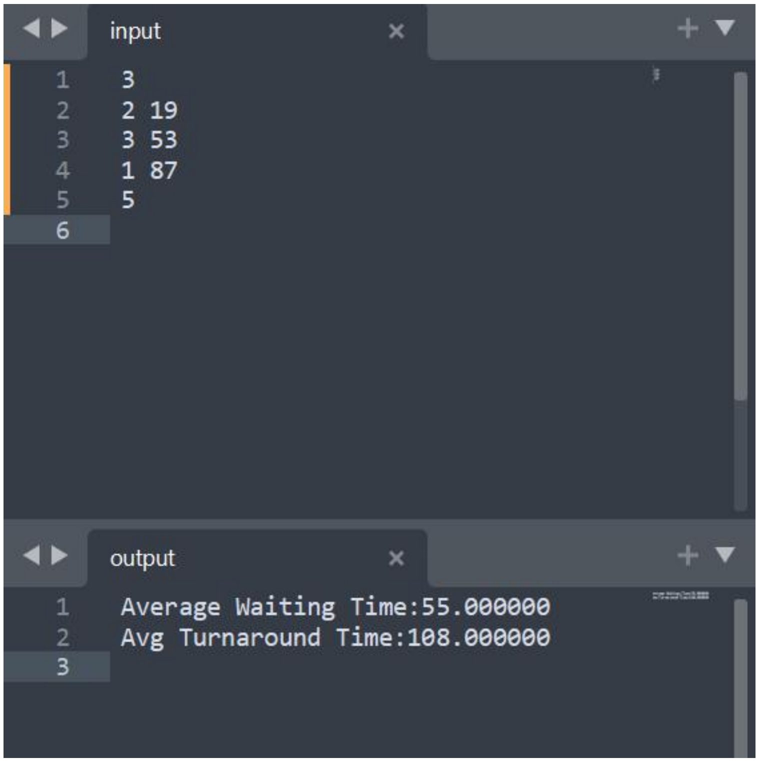
```
Average Waiting Time: 62.000000
Average Turnaround Time: 115.000000
```

4. Round Robin
Code:

```
// Author: Chaudhary Hamdan, 1905387

#include<stdio.h>

int main()
{

#ifndef ONLINE_JUDGE
	freopen("C:\\Users\\KIIT\\input", "r", stdin);
	freopen("C:\\Users\\KIIT\\output", "w", stdout);
#endif



	int i, limit, total = 0, x, counter = 0, time_quantum;
	int wait_time = 0, turnaround_time = 0, arrival_time[10], burst_time
				[10], temp[10];
	float average_wait_time, average_turnaround_time;
	scanf("%d", &limit);
	x = limit;
	for (i = 0; i < limit; i++)
	{
		scanf("%d", &arrival_time[i]);
		scanf("%d", &burst_time[i]);
		temp[i] = burst_time[i];
	}
	scanf("%d", &time_quantum);
	for (total = 0, i = 0; x != 0;)
	{
		if (temp[i] <= time_quantum && temp[i] > 0)
		{
			total = total + temp[i];
			temp[i] = 0;
			counter = 1;
		}
		else if (temp[i] > 0)
		{
```

```
            temp[i] = temp[i] - time_quantum;
            total = total + time_quantum;
        }
        if (temp[i] == 0 && counter == 1)
        {
            x--;
            wait_time = wait_time + total - arrival_time[i] -
                burst_time[i];
            turnaround_time = turnaround_time + total -
                  arrival_time[i];
            counter = 0;
        }
        if (i == limit - 1)
        {
            i = 0;
        }
        else if (arrival_time[i + 1] <= total)
        {
            i++;
        }
        else
        {
            i = 0;
        }
    }
    average_wait_time = wait_time * 1.0 / limit;
    average_turnaround_time = turnaround_time * 1.0 / limit;
    printf("Average Waiting Time:%f", average_wait_time);
    printf("\nAvg Turnaround Time:%f\n", average_turnaround_time);
    return 0;
}
```

Output:



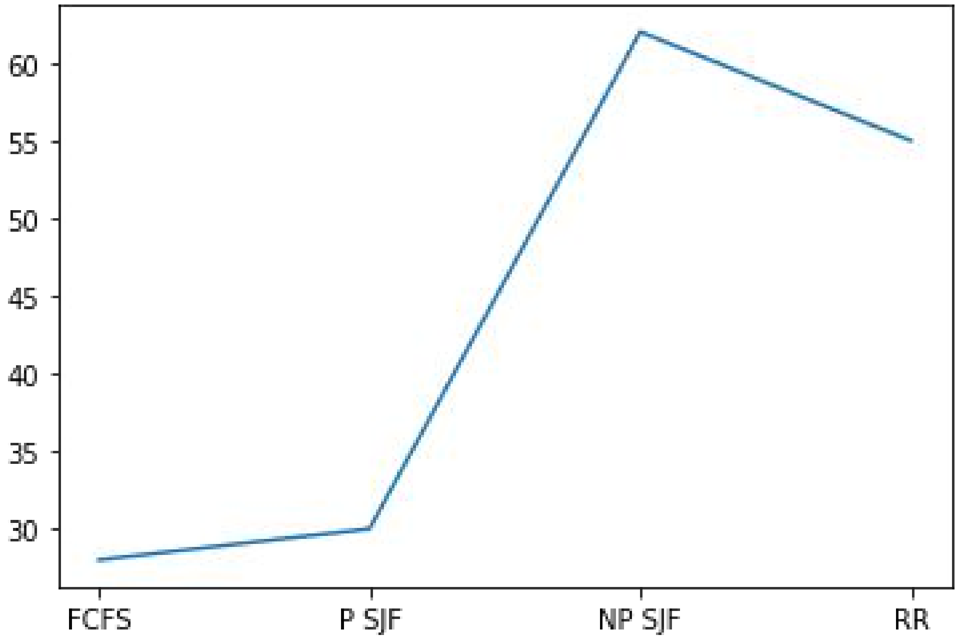
```
3
2 19
3 53
1 87
5
```

```
Average Waiting Time:55.000000
Avg Turnaround Time:108.000000
```

Average Waiting Time:

FCFS: 28
SJF Preemptive: 30
SJF Non Preemptive: 62
Round Robin: 55

Graph:


FCFS
P SJF
NP SJF
RR