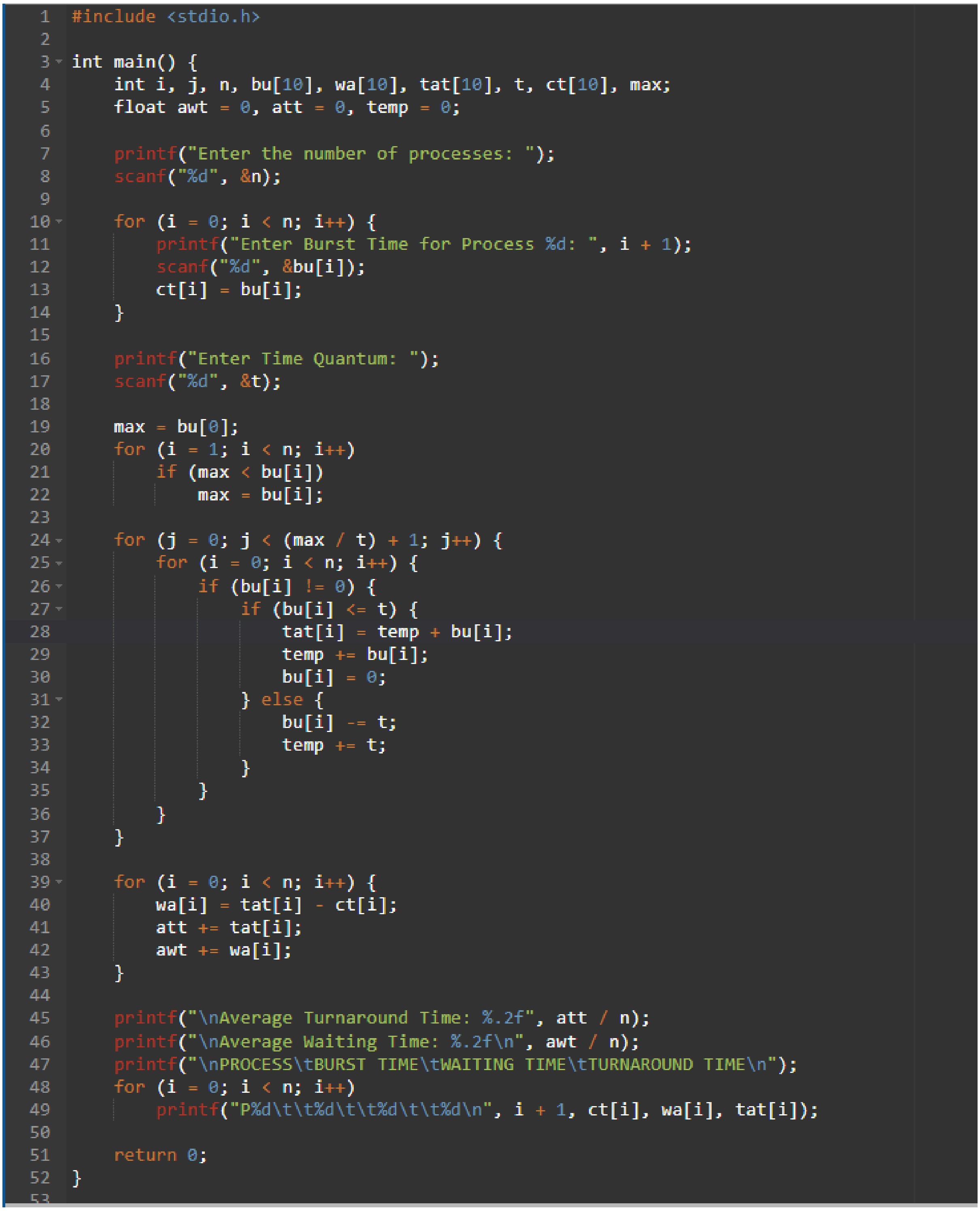
NAME: M.HASSAN HAYAT
ROLL NO: DT-22010
COURSE: OS

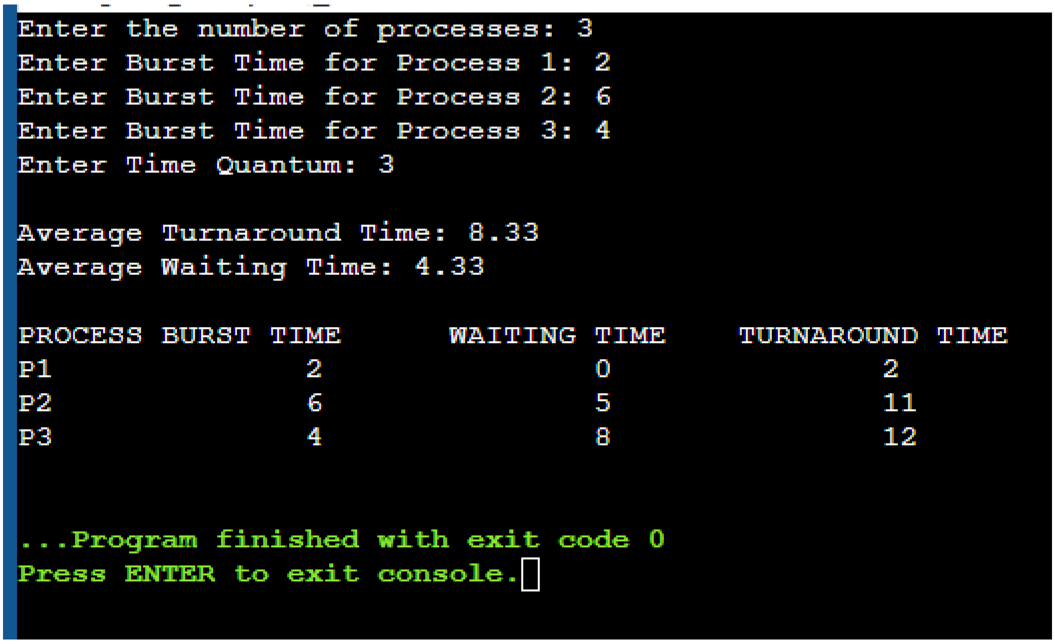
LAB NO 2:

3) Implement the Round Robin code and paste the output below.

```
#include <stdio.h>

int main() {
    int i, j, n, bu[10], wa[10], tat[10], t, ct[10], max;
    float awt = 0, att = 0, temp = 0;

    printf("Enter the number of processes: ");
    scanf("%d", &n);

    for (i = 0; i < n; i++) {
        printf("Enter Burst Time for Process %d: ", i + 1);
        scanf("%d", &bu[i]);
        ct[i] = bu[i];
    }

    printf("Enter Time Quantum: ");
    scanf("%d", &t);

    max = bu[0];
    for (i = 1; i < n; i++)
        if (max < bu[i])
            max = bu[i];

    for (j = 0; j < (max / t) + 1; j++) {
        for (i = 0; i < n; i++) {
            if (bu[i] != 0) {
                if (bu[i] <= t) {
                    tat[i] = temp + bu[i];
                    temp += bu[i];
                    bu[i] = 0;
                } else {
                    bu[i] -= t;
                    temp += t;
                }
            }
        }
    }

    for (i = 0; i < n; i++) {
        wa[i] = tat[i] - ct[i];
        att += tat[i];
        awt += wa[i];
    }

    printf("\nAverage Turnaround Time: %.2f", att / n);
    printf("\nAverage Waiting Time: %.2f\n", awt / n);
    printf("\nPROCESS\tBURST TIME\tWAITING TIME\tTURNAROUND TIME\n");
    for (i = 0; i < n; i++)
        printf("P%d\t\t%d\t\t%d\t\t%d\n", i + 1, ct[i], wa[i], tat[i]);

    return 0;
}
```



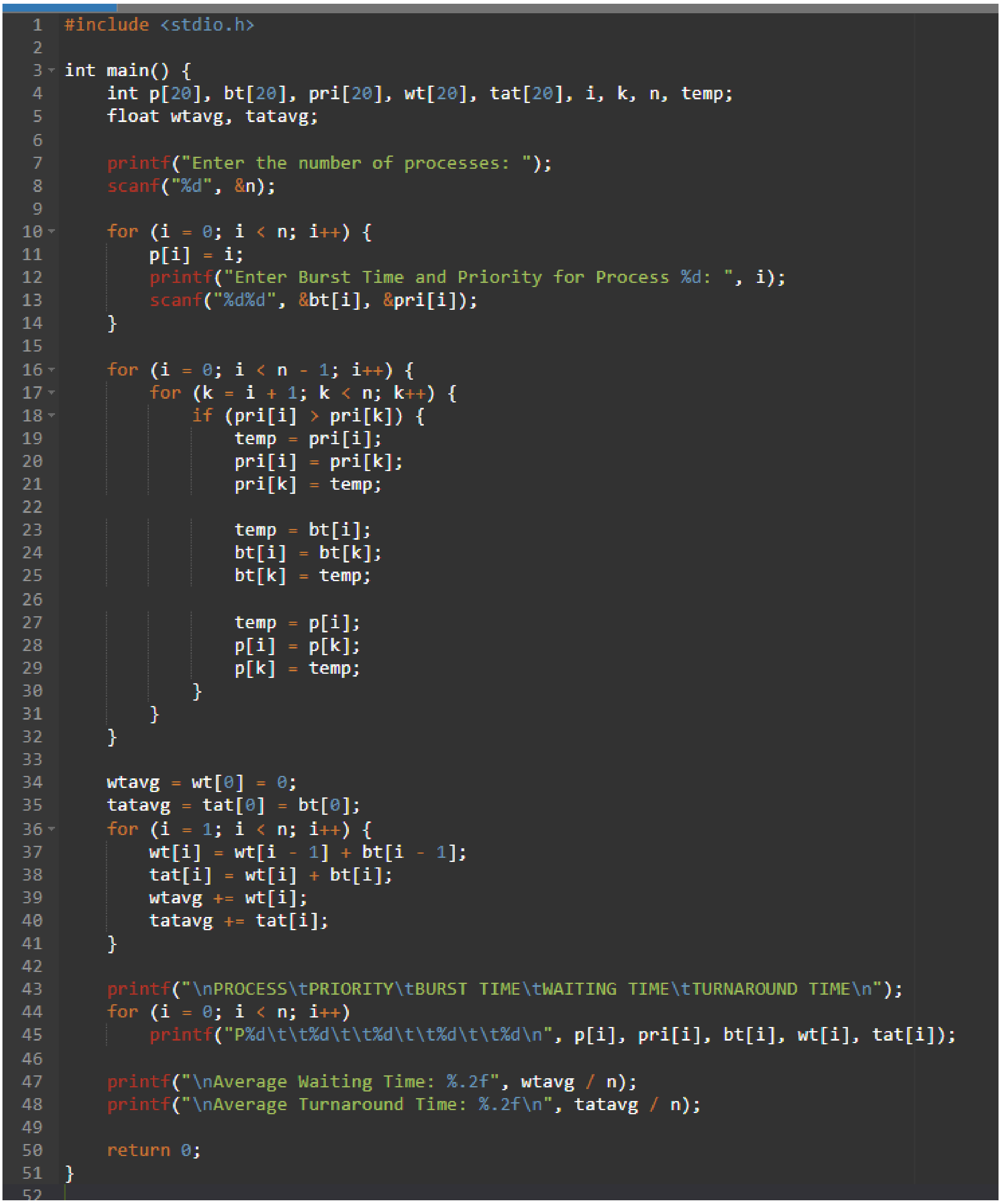
```c
#include <stdio.h>

int main() {
    int i, j, n, bu[10], wa[10], tat[10], t, ct[10], max;
    float awt = 0, att = 0, temp = 0;

    printf("Enter the number of processes: ");
    scanf("%d", &n);

    for (i = 0; i < n; i++) {
        printf("Enter Burst Time for Process %d: ", i + 1);
        scanf("%d", &bu[i]);
        ct[i] = bu[i];
    }

    printf("Enter Time Quantum: ");
    scanf("%d", &t);

    max = bu[0];
    for (i = 1; i < n; i++)
        if (max < bu[i])
            max = bu[i];

    for (j = 0; j < (max / t) + 1; j++) {
        for (i = 0; i < n; i++) {
            if (bu[i] != 0) {
                if (bu[i] <= t) {
                    tat[i] = temp + bu[i];
                    temp += bu[i];
                    bu[i] = 0;
                } else {
                    bu[i] -= t;
                    temp += t;
                }
            }
        }
    }

    for (i = 0; i < n; i++) {
        wa[i] = tat[i] - ct[i];
        att += tat[i];
        awt += wa[i];
    }

    printf("\nAverage Turnaround Time: %.2f", att / n);
    printf("\nAverage Waiting Time: %.2f\n", awt / n);
    printf("\nPROCESS\tBURST TIME\tWAITING TIME\tTURNAROUND TIME\n");
    for (i = 0; i < n; i++)
        printf("P%d\t\t%d\t\t%d\t\t%d\n", i + 1, ct[i], wa[i], tat[i]);

    return 0;
}
```



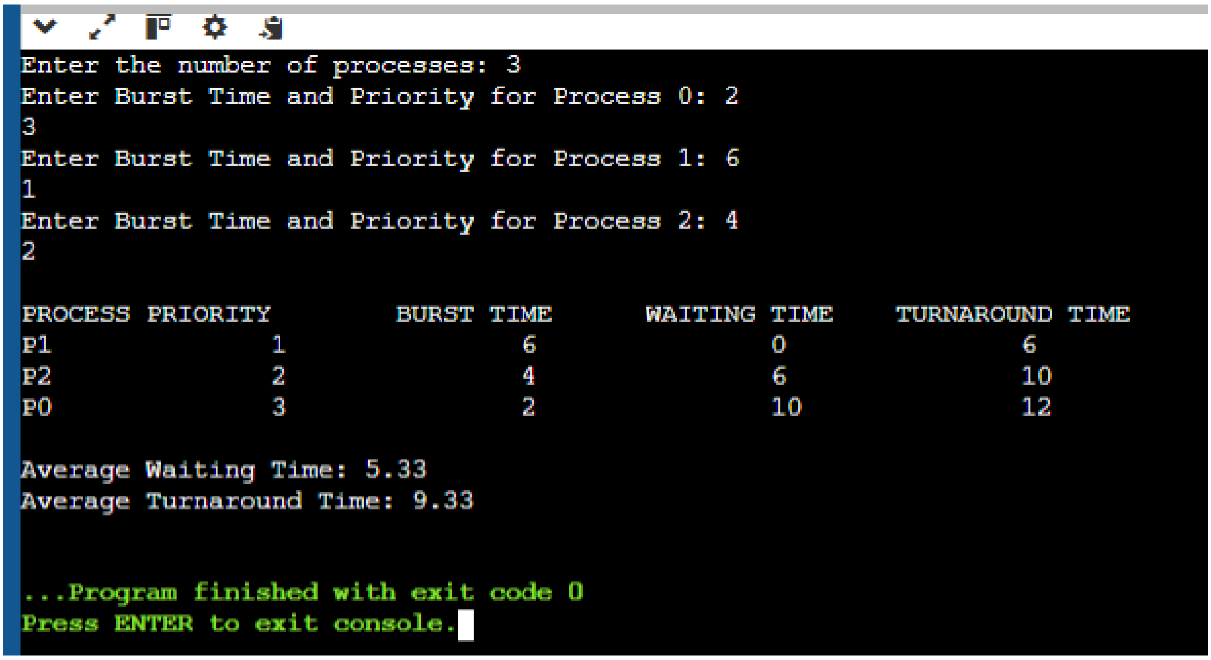
```
Enter the number of processes: 3
Enter Burst Time for Process 1: 2
Enter Burst Time for Process 2: 6
Enter Burst Time for Process 3: 4
Enter Time Quantum: 3

Average Turnaround Time: 8.33
Average Waiting Time: 4.33

PROCESS BURST TIME       WAITING TIME     TURNAROUND TIME
P1              2                0                2
P2              6                5                11
P3              4                8                12


...Program finished with exit code 0
Press ENTER to exit console.
```

4) Implement the Priority Based Scheduling code and paste the output below.

```
#include <stdio.h>

int main() {
    int p[20], bt[20], pri[20], wt[20], tat[20], i, k, n, temp;
    float wtavg, tatavg;

    printf("Enter the number of processes: ");
    scanf("%d", &n);

    for (i = 0; i < n; i++) {
        p[i] = i;
        printf("Enter Burst Time and Priority for Process %d: ", i);
        scanf("%d%d", &bt[i], &pri[i]);
    }

    for (i = 0; i < n - 1; i++) {
        for (k = i + 1; k < n; k++) {
            if (pri[i] > pri[k]) {
                temp = pri[i];
                pri[i] = pri[k];
                pri[k] = temp;

                temp = bt[i];
                bt[i] = bt[k];
                bt[k] = temp;
                temp = p[i];
                p[i] = p[k];
                p[k] = temp;
            }
        }
    }

    wtavg = wt[0] = 0;
    tatavg = tat[0] = bt[0];
    for (i = 1; i < n; i++) {
        wt[i] = wt[i - 1] + bt[i - 1];
        tat[i] = wt[i] + bt[i];
        wtavg += wt[i];
        tatavg += tat[i];
    }

    printf("\nPROCESS\tPRIORITY\tBURST TIME\tWAITING TIME\tTURNAROUND
TIME\n");
    for (i = 0; i < n; i++)
        printf("P%d\t\t%d\t\t%d\t\t%d\t\t%d\n", p[i], pri[i], bt[i], wt[i], tat[i]);

    printf("\nAverage Waiting Time: %.2f", wtavg / n);
    printf("\nAverage Turnaround Time: %.2f\n", tatavg / n);

    return 0;
}
```



```c
#include <stdio.h>

int main() {
    int p[20], bt[20], pri[20], wt[20], tat[20], i, k, n, temp;
    float wtavg, tatavg;

    printf("Enter the number of processes: ");
    scanf("%d", &n);

    for (i = 0; i < n; i++) {
        p[i] = i;
        printf("Enter Burst Time and Priority for Process %d: ", i);
        scanf("%d%d", &bt[i], &pri[i]);
    }

    for (i = 0; i < n - 1; i++) {
        for (k = i + 1; k < n; k++) {
            if (pri[i] > pri[k]) {
                temp = pri[i];
                pri[i] = pri[k];
                pri[k] = temp;

                temp = bt[i];
                bt[i] = bt[k];
                bt[k] = temp;

                temp = p[i];
                p[i] = p[k];
                p[k] = temp;
            }
        }
    }

    wtavg = wt[0] = 0;
    tatavg = tat[0] = bt[0];
    for (i = 1; i < n; i++) {
        wt[i] = wt[i - 1] + bt[i - 1];
        tat[i] = wt[i] + bt[i];
        wtavg += wt[i];
        tatavg += tat[i];
    }

    printf("\nPROCESS\tPRIORITY\tBURST TIME\tWAITING TIME\tTURNAROUND TIME\n");
    for (i = 0; i < n; i++)
        printf("P%d\t\t%d\t\t%d\t\t%d\t\t%d\n", p[i], pri[i], bt[i], wt[i], tat[i]);

    printf("\nAverage Waiting Time: %.2f", wtavg / n);
    printf("\nAverage Turnaround Time: %.2f\n", tatavg / n);

    return 0;
}
```



```
Enter the number of processes: 3
Enter Burst Time and Priority for Process 0: 2
3
Enter Burst Time and Priority for Process 1: 6
1
Enter Burst Time and Priority for Process 2: 4
2

PROCESS PRIORITY        BURST TIME      WAITING TIME      TURNAROUND TIME
P1              1               6               0               6
P2              2               4               6               10
P0              3               2               10              12

Average Waiting Time: 5.33
Average Turnaround Time: 9.33


...Program finished with exit code 0
Press ENTER to exit console.
```

5) Execute all scheduling algorithms on following data and find out the Average Waiting Time and
Average Turnaround Time of all scheduling algorithms and discuss your results. (Quantum Value is 3)

1. First Come First Serve (FCFS)

Order of execution: **P0 -> P1 -> P2**

Process	Burst Time	Waiting Time	Turnaround Time
P0	2	0	2
P1	6	2	8
P2	4	8	12

AWT = (0 + 2 + 8) / 3 = **3.33**
TAT = (2 + 8 + 12) / 3 = **7.33**

2. Shortest Job First (SJF)

Order of execution**: P0 -> P2 -> P1**

Process	**Burst Time**	**Waiting Time**	**Turnaround Time**
P0	2	0	2
P2	4	2	6
P1	6	6	12

AWT = (0 + 2 + 6) / 3 **= 2.67**
TAT = **(**2 + 6 + 12) / 3 **= 6.67**

3. Round Robin (Quantum = 3)

Execution order: **P0 -> P1 -> P2 -> P1**

Process	**Burst Time**	**Waiting Time**	**Turnaround Time**
P0	2	0	2

P1	6	7	13
P2	4	3	7

AWT = (0 + 7 + 3) / 3 **= 3.33**
TAT = (2 + 13 + 7) / 3 **= 7.33**

4. Priority Scheduling

Order of execution (based on priority): **P1 -> P2 -> P0**

Process	Burst Time	Priority	Waiting Time	Turnaround Time
P1	6	1	0	6
P2	4	2	6	10
P0	2	3	10	12

AWT = (0 + 6 + 10) / 3 = **5.33**
TAT = (6 + 10 + 12) / 3 = **9.33**

Algorithm	Average Waiting Time	Average Turnaround Time

FCFS	3.33	7.33
SJF	2.67	6.67
Round Robin	3.33	7.33
Priority	5.33	9.33

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