Completion time (CT) – time passed from the very beginning to the process termination.

Waiting time (WT) – time passed from the beginning of execution to the termination of the process.

Turnaround time (TAT) – time passed from arrival time to termination time.

Note that in table printed by program processes are sorted by process number.

1. First come first served – batch scheduling algorithm that executes tasks in order of arrival

AT, BT	1	2	3	4	5	6	7	8
(1, 2)								
(2, 3)								
(3, 2)								

	Running
	Terminated
	Waiting
	Not arrived yet

```
====================================
First-come first-served scheduler
====================================
input number of processes: 3
input arrival time of process #0: 1
input burst time of process #0: 2
input arrival time of process #1: 2
input burst time of process #1: 3
input arrival time of process #2: 3
input burst time of process #2: 2

P#      AT      BT      CT      TAT     WT
P0      1       2       3       2       0
P1      2       3       6       4       1
P2      3       2       8       5       3
Average Turnaround Time = 3.666667
Average Waiting Time = 1.333333
```

2. Shortest job first – batch scheduling algorithm that executes tasks with minimal burst time first

AT, BT	1	2	3	4	5	6	7	8
(1, 2)								
(2, 3)								
(3, 2)								

	Running
	Terminated
	Waiting
	Not arrived yet

```
====================================
Shortest task first scheduler
====================================
input number of processes: 3
input arrival time of process #0: 1
input burst time of process #0: 2
input arrival time of process #1: 2
input burst time of process #1: 3
input arrival time of process #2: 3
input burst time of process #2: 2

P#      AT      BT      CT      TAT     WT
P0      1       2       3       2       0
P1      2       3       8       6       3
P2      3       2       5       2       0
Average Turnaround Time = 3.333333
Average Waiting Time = 1.000000
```

3. Round-robin – interactive systems scheduling algorithm that gives processes equal share of time called quantum; when the process exceeds its quantum, it is put at the end of the queue and scheduler switches to the next process

Quantum = 1

AT, BT	1	2	3	4	5	6	7	8
(1, 2)								
(2, 3)								
(3, 2)								

	Running
	Terminated
	Waiting
	Not arrived yet

```
===================================
Round-robin scheduler
===================================
input quantum length: 1
input number of processes: 3
input arrival time of process #0: 1
input burst time of process #0: 2
input arrival time of process #1: 2
input burst time of process #1: 3
input arrival time of process #2: 3
input burst time of process #2: 2

P#      AT      BT      CT      TAT     WT
P0      1       2       5       4       2
P1      2       3       8       6       3
P2      3       2       7       4       2
Average Turnaround Time = 4.666667
Average Waiting Time = 2.333333
```

In this example, Shortest job first shows the best average TAT and WT. However, in practice it is often hard to determine what jobs will be the shortest to apply this algorithm.

In interactive systems, round-robin scheduling is more preferable as it eliminates resource starvation problem, when one process can prevent all others from execution for unlimited long time.
Round-robin scheduling performance can be improved with optimal quantum length:

```
===================================
Round-robin scheduler
===================================
input quantum length: 2
input number of processes: 3
input arrival time of process #0: 1
input burst time of process #0: 2
input arrival time of process #1: 2
input burst time of process #1: 3
input arrival time of process #2: 3
input burst time of process #2: 2

P#      AT      BT      CT      TAT     WT
P0      1       2       3       2       0
P1      2       3       8       6       3
P2      3       2       7       4       2
Average Turnaround Time = 4.000000
Average Waiting Time = 1.666667
```