COSC 3346 Operating Systems

Homework 1

1. Consider the following set of processes, with the length of the CPU burst given in milliseconds:

|  |  |  |
| --- | --- | --- |
| Process | Burst Time | Priority |
| P1 | 4 | 2 |
| P2 | 3 | 1 |
| P3 | 7 | 3 |
| P4 | 5 | 4 |

The processes are assumed to have arrived in the order P1, P2, P3, and P4. Consider the largest number indicates the highest priority.

1. Draw three Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: **FCFS (First Come First Served),** **SJF (Shortest Job First), and non-preemptive priority.**

FCFS:

|  |  |  |  |
| --- | --- | --- | --- |
| P1 | P2 | P3 | P4 |

0 4 7 14 19

SJF:

|  |  |  |  |
| --- | --- | --- | --- |
| P2 | P1 | P4 | P3 |

0 3 7 12 19

Non-preemptive priority:

|  |  |  |  |
| --- | --- | --- | --- |
| P4 | P3 | P1 | P2 |

0 5 12 16 19

1. What is the waiting time of each process of these scheduling algorithms?

|  |  |  |  |
| --- | --- | --- | --- |
| Process | FCFS | SJF | Priority (non-preemptive) |
| P1 | 0 | 3 | 12 |
| P2 | 4 | 0 | 16 |
| P3 | 7 | 12 | 5 |
| P4 | 14 | 7 | 0 |
| Average: | 6.25 | 5.5 | 8.25 |

1. Which of the algorithms results in the minimum average waiting time (over all processes)?

**Shortest Job First has the best average waiting time**

2. Consider the following table for processes P1, P2, and P3 with their arrival and burst times:

|  |  |  |
| --- | --- | --- |
| Process | Arrival Time | Burst Time |
| P1 | 0.0 | 10 |
| P2 | 1.5 | 6 |
| P3 | 2.5 | 4 |

1. What are the average waiting time and the turnaround time for these processes with the FCFS scheduling algorithm?

FCFS:

|  |  |  |
| --- | --- | --- |
| P1 | P2 | P3 |

0 10 16 20

Average Waiting Time: 7.333

Average turn-around time: 14

b. What are the average waiting time and the turnaround time for these processes with the SJF scheduling algorithm?

SJF:

|  |  |  |
| --- | --- | --- |
| P1 | P3 | P2 |

0 10 14 20

Average Waiting Time: 6.666

Average turn-around time: 13.333