Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Out of 105 points

1. **Scheduling.**How can fairness and throughput be competing goals for a scheduler?  Give an example where a fair scheduler makes bad use of the CPU, and an example where a high-throughput scheduler is unfair.
2. (10 pts) CPU Scheduling (10pts) First Come First Serve (FCFS)

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Process ID** | **Arrival Time** | **Burst Time** | **Priority** |
| P1 | 0 | 4 | 3 |
| P2 | 1 | 5 | 2 |
| P3 | 3 | 2 | 4 |
| P4 | 12 | 7 | 1 |
| P5 | 13 | 3 | 3 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |

For each process compute the following. Show your work:

Wait time

Turnaround time

Throughput:

For all the processes compute the following and show your work:

Average Wait time

Average Turnaround time

Average Throughput:

1. (10 pts) CPU Scheduling: Shortest Job First (SJF)

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Process ID** | **Arrival Time** | **Burst Time** | **Priority** |
| P1 | 0 | 4 | 3 |
| P2 | 1 | 5 | 2 |
| P3 | 3 | 2 | 4 |
| P4 | 9 | 6 | 1 |
| P5 | 10 | 3 | 3 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |

For each process compute the following. Show your work:

Wait time

Turnaround time

Throughput:

For all the processes compute the following and show your work:

Average Wait time

Average Turnaround time

Average Throughput:

1. (10 pts) CPU Scheduling: Round Robin (RR) with quantum=1

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Process ID** | **Arrival Time** | **Burst Time** | **Priority** |
| P1 | 0 | 4 | 3 |
| P2 | 1 | 5 | 2 |
| P3 | 3 | 2 | 4 |
| P4 | 9 | 6 | 1 |
| P5 | 10 | 3 | 3 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |

For each process compute the following. Show your work:

Wait time

Turnaround time

Throughput:

For all the processes compute the following and show your work:

Average Wait time

Average Turnaround time

Average Throughput: