

**CS-311 Operating Systems**  
**Assignment 2**

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**Q1. Compute the response time and turnaround time when running three jobs of length 200 with the SJF and FIFO schedulers.**

*Assuming all jobs arrive at  $t = 0$*

For SJF:

$$\text{Turnaround Time} = (200-0) + (400-0) + (600-0) / 3 = 400$$

$$\text{Response Time} = (0-0) + (200-0) + (400-0) / 3 = 200$$

For FIFO:

$$\text{Turnaround Time} = (200-0) + (400-0) + (600-0) / 3 = 400$$

$$\text{Response Time} = (0-0) + (200-0) + (400-0) / 3 = 200$$

**Q2. Now do the same but with jobs of different lengths: 100, 200, and 300.**

*Assuming all jobs arrive at  $t = 0$*

For SJF:

$$\text{Turnaround Time} = (100-0) + (300-0) + (600-0) / 3 = 333.33$$

$$\text{Response Time} = (0-0) + (100-0) + (300-0) / 3 = 133.33$$

*Assuming jobs run in order 100, 200 and 300*

For FIFO:

$$\text{Turnaround Time} = (100-0) + (300-0) + (600-0) / 3 = 333.33$$

$$\text{Response Time} = (0-0) + (100-0) + (300-0) / 3 = 133.33$$

**Q3. Now do the same, but also with the RR scheduler and a time-slice of 1.**

*For all 3 jobs with length 200*

$$\text{Turnaround Time} = (598-0) + (599-0) + (600-0) / 3 = 599$$

$$\text{Response Time} = (0-0) + (1-0) + (2-0) / 3 = 1$$

*For jobs of different lengths: 100, 200, and 300*

$$\text{Turnaround Time} = (298-0) + (499-0) + (600-0) / 3 = 465.67$$

$$\text{Response Time} = (0-0) + (1-0) + (2-0) / 3 = 1$$

**Q4. For what types of workloads does SJF deliver the same turnaround times as FIFO?**

SJF delivers the same workload as FIFO for jobs that arrive in such an order that the shortest job comes first then the next shortest job and so on, doing so creates the same Gantt chart for each of the schedulers and hence give an equal turnaround time for both SJF and FIFO schedulers. Also, when all the jobs that come need the same amount of CPU time to finish their execution as seen in Q1 above.

**Q5. For what types of workloads and quantum lengths does SJF deliver the same response times as RR?**

SJF and RR schedulers will have the same response time for jobs where the time quantum of the RR scheduler is equal to the length of each job such that if we have 3 jobs of 200ms that arrive at  $t = 0$  and a time quantum of 200ms for our RR scheduler. The starting grant chart of SJF and RR would be similar and would both lead to the same response time(1ms) as similar jobs would have the same time of first run in both types of schedulers. Hence similar first run time and arrival time of the same corresponding jobs in both schedulers would provide similar response time.