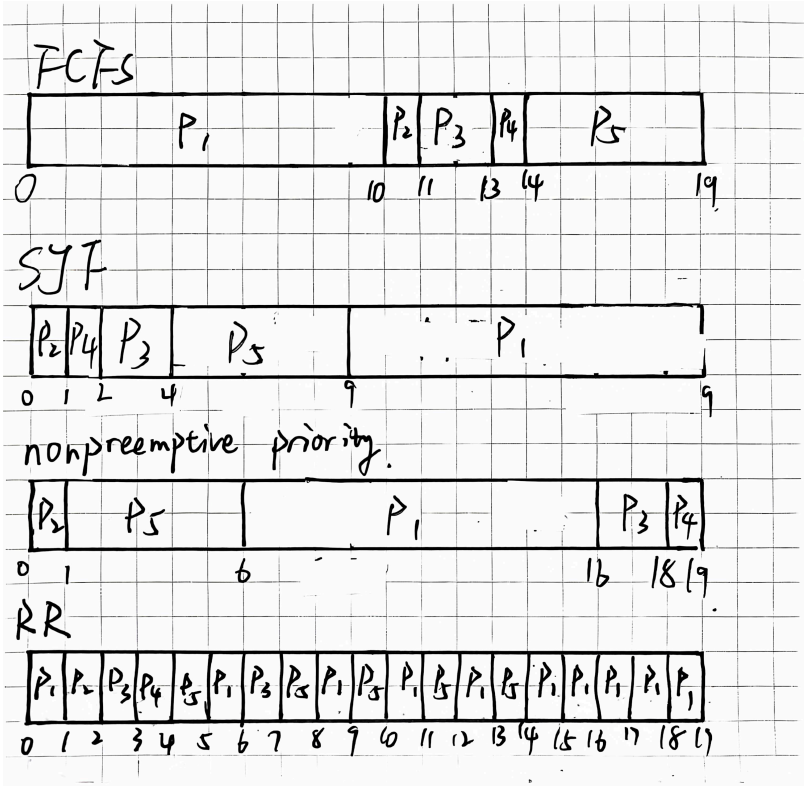
5.4

- **a.**



- **b. turnaround time**

	FCFS	SJF	Priority	RR
P_1	10	19	16	19
P_2	11	1	1	2
P_3	13	4	18	7
P_4	14	2	19	4
P_5	19	9	6	14

- **c. waiting time**

	FCFS	SJF	Priority	RR
P_1	0	9	6	9
P_2	10	0	0	1
P_3	11	2	16	5
P_4	13	1	18	3
P_5	14	4	1	9

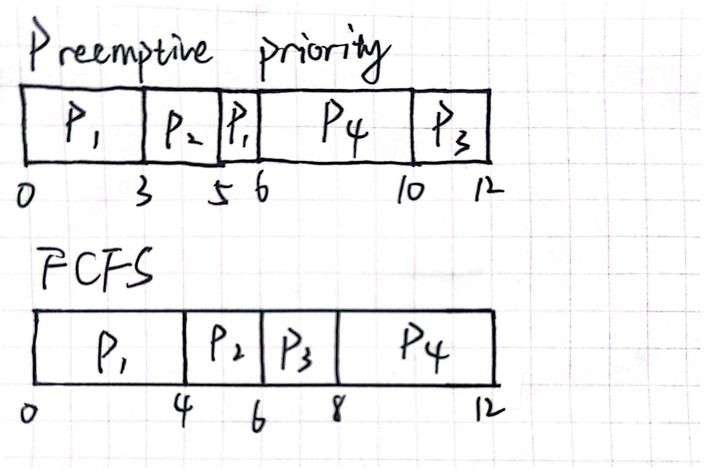
- **d.** SJF 平均等待时间最小

5.5

Shortest job first and priority 会导致饥饿

补充题 1

- **(1)**



- **(2) waiting time**

	Priority	FCFS
P_1	2	0
P_2	0	1
P_3	6	2
P_4	0	2
Average	2	1.25

preemptive priority 的平均等待时间：2
FCFS 的平均等待时间：1.25

- **(3) turnaround time**

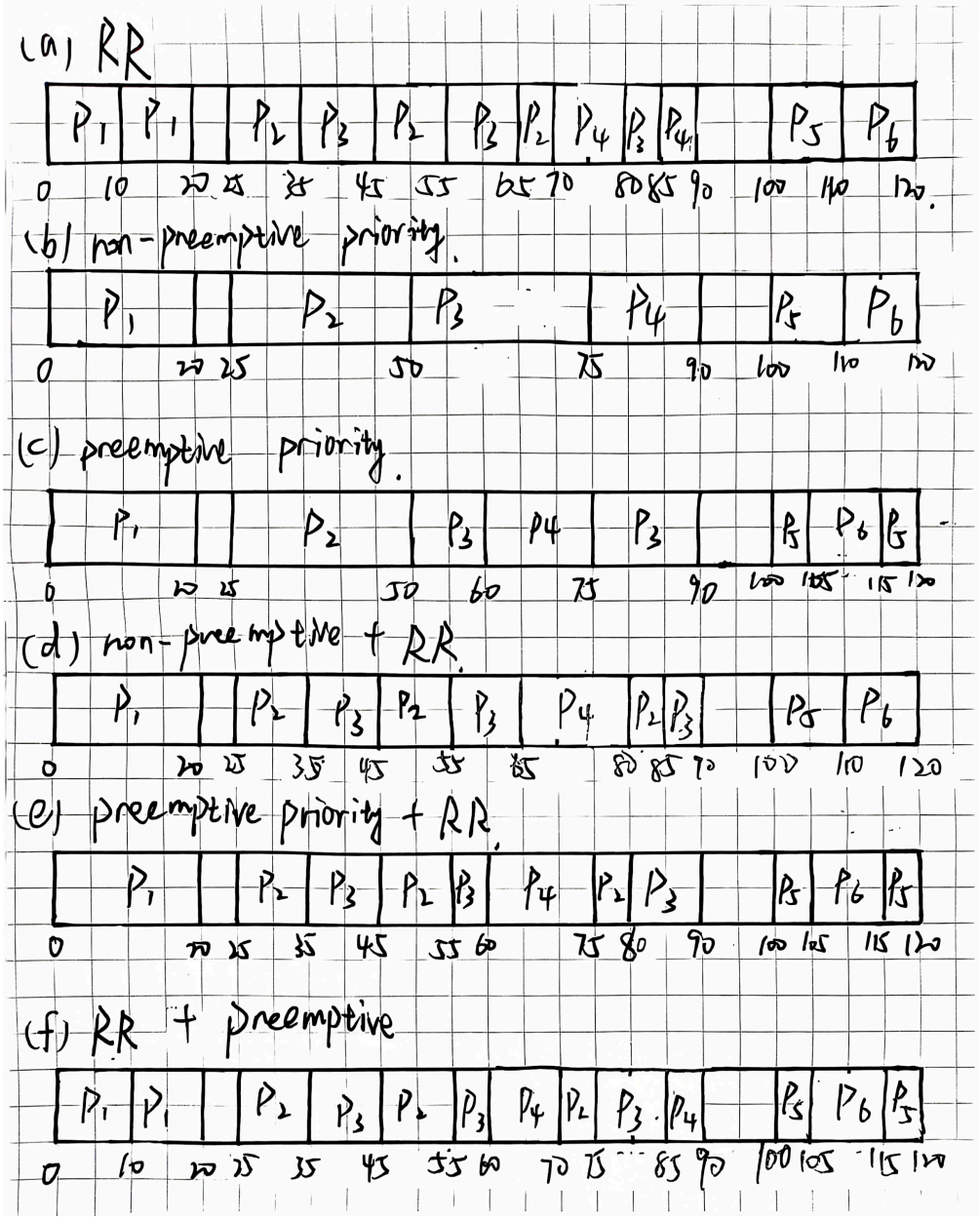
	Priority	FCFS
P_1	6	4
P_2	2	3
P_3	8	4
P_4	4	6
Average	5	4.25

preemptive priority 的平均周转时间：5
FCFS 的平均周转时间：4.25

- **(4)**
  preemptive priority：P_1, P_2, P_3, P_4
  FCFS：P_1, P_3

补充题 2

- **(1)** 空白格子表示执行 Pidle



- **(2) turnaround time**

	RR	NP	PP	NP+RR	PP+RR	RR+PP
P_1	20	20	20	20	20	20
P_2	45	25	25	60	55	50
P_3	55	45	60	60	60	55
P_4	30	30	15	20	15	30
P_5	10	10	20	10	20	20
P_6	15	15	10	15	10	10

- **(3)waiting time**

	RR	NP	PP	NP+RR	PP+RR	RR+PP
P_1	0	0	0	0	0	0
P_2	20	0	0	35	30	25
P_3	30	20	35	35	35	30
P_4	15	15	0	5	0	15
P_5	0	0	10	0	10	10
P_6	5	5	0	5	0	0

- **(4)**

$$CPU\ Utilization\ Rate = \frac{105}{120} \times 100\% = 87.5\%$$