9.1

Process	Burst Time	Priority	Arrival Time
P1	50 ms	4	0 ms
P2	20 ms	1	20 ms
P3	100 ms	3	40 ms
P4	40 ms	2	60 ms

a)

SHORTEST REMAINING TIME:

	Finish Time	Turn around Time	Waiting Time
P1	70 ms	70 ms	20 ms
P2	40 ms	20 ms	0 ms
P3	2̶0̶0̶ 210 ms	170 ms	70 ms
P4	110 ms	150 ms	10 ms

Taking 1 unit = 10 ms

| P1 | P2 | P1 | P4 | P3 |

$P2 < P1$

RW

P1 = 50 - 20 = 30 - 20 = 10

P2 = 20 - 20 = 0

P3 = 100

P4 = 60 - 40

NON-PREEMTIVE PRIORITY:

	Finish Time	Turn around time	Waiting Time
P1	50 ms	50 ms	0 ms
P2	70 ms	50 ms	30 ms
P3	210 ms	170 ms	70 ms
P4	110 ms	50 ms	10 ms
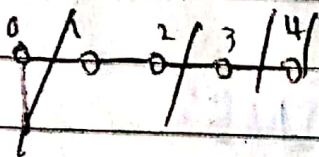
Taking 1 unit = 10 ms
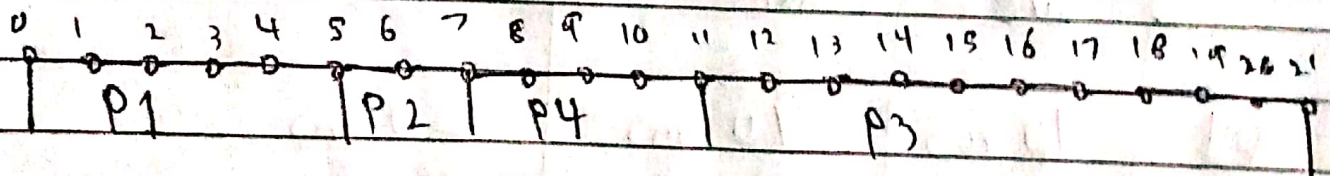
ROUND ROBIN:

	Finish Time	Turn around Time	Waiting Time
P1	70 ms	70 ms	20 ms
P2	50 ms	30 ms	10 ms
P3	210 ms	170 ms	70 ms
P4	170 ms	110 ms	70 ms

$q = 30$ ms

Taking 1 unit = 10 ms

```
 0  1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20  21
 |  P1  |  P2  |  P1  |  P3  |  P4  |    P3   | P4 |   P3   |    | P3 |
```

R W
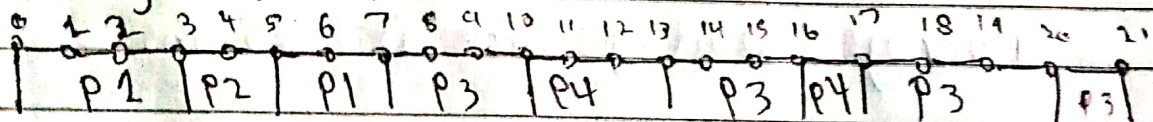
| P3 | P4 | P3 | P4 | P3 | P4 | P1 |

P1 = 50 - 30 = 20 - 20 = 0

P2 = 20 - 20 = 0

P3 = 100 - 30 = 70 - 30 = 40 - 30 = 10 - 10

P4 = 40 - 30 = 10 - 10 = 0

AVERAGE WAITING TIME:

SHORTEST REMAINING Time

Process	Waiting time
P1	20 ms
P2	0 ms
P3	70 ms
P4	10 ms
	Mean = 25 ms

Average waiting time is 25 ms

NON-PREEMPTIVE PRIORITY:

Process	Waiting Time
P1	20 0 ms
P2	0 30 ms
P3	70 70 ms
P4	10 10 ms
	Mean = 27.5 ms

Average waiting time is 27.5 ms

ROUND ROBIN SCHEDULING

Process	Waiting time
P1	20 ms
P2	10 ms
P3	70 ms
P4	70 ms
	Mean = 42.5 ms

Average waiting time is 42.5 ms

9.2

Given DATA:

Process	Arrival Time	Processing Time
P1	0	12
P2	2	6
P3	8	18
P4	10	4

1) Average Turn around time at ~~q=2~~

$$q = 2$$

	Finish Time	Turnaround time
P1	28	28
P2	14	12
P3	40	32
P4	22	12
		Mean = 21

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

P1	P2	P1	P2	P1	P3	P2	P4	P1	P3	P4	P1	P3

26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

P1	P3	P3	P3	P3	P3	P3
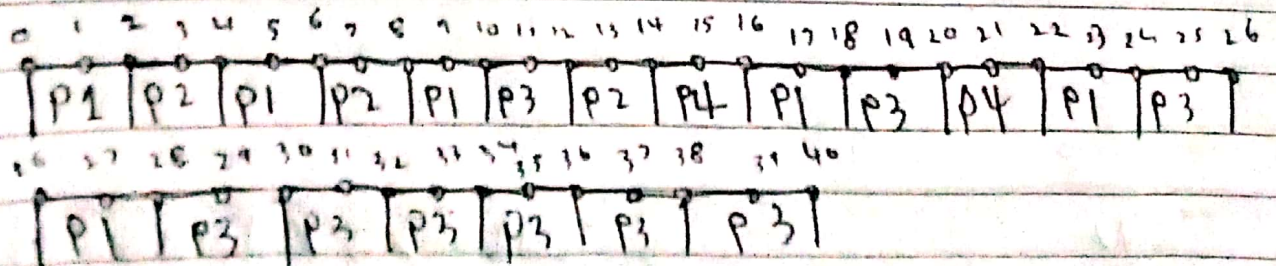
Rough work

Average turn around time at q=2 is 21.

2) Average waiting time at q=4

	Finish Time	Turn around time
P1	26	26
P2	18	16
P3	40	32
P4	22	12
		Mean = 21.5

```
0  1  2  3  4  5  6  7  8  9  10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
|    P1    |    P2    |    P1    |    P3    | P2 | P4  |    P1    |

26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
|    P3    |    P3    |    P3    |  P3 |
```
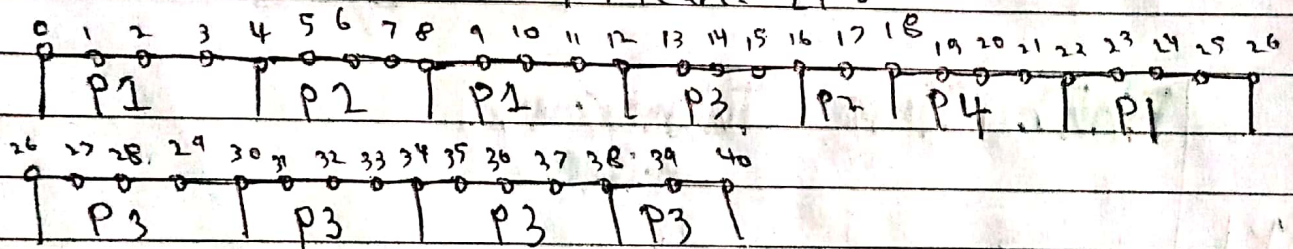
Average turn around time is 21.5

R.W

P1 = 12 - 4 = 8 - 4 = 4 - 4 = 0

P2 = 6 - 4 = 2 - 2 = 0

P3 = 18 - 4 = 14 - 4 = 10 - 4 = 6 - 4 = 2 - 2 = 0

P4 = 4 - 4 = 0

3) Average waiting time at q = 8

	Finish Time	Turn Around Time
P1	26	Time 26
P2	14	12
P3	40	32
P4	30	20
		Mean = 22.5

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

| P1 | P2 | P3 | P1 |

16 17 18 19 30 31 32 33 34 35 36 37 38 39 40

| P4 | P3 | P3 |
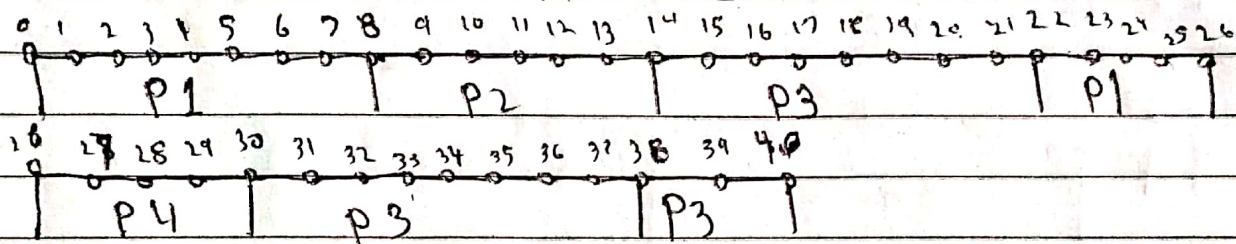
Average turn around time is 22.5

R.W

P1 = 12 - 8 - 4 - 4 = 0

| P3 | P1 | P4 | P3 | P1 |