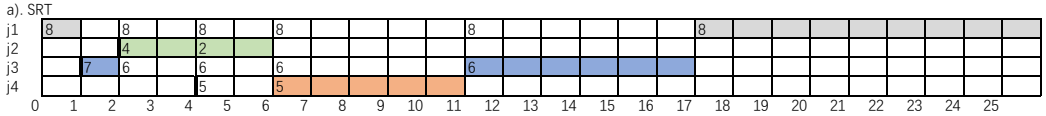
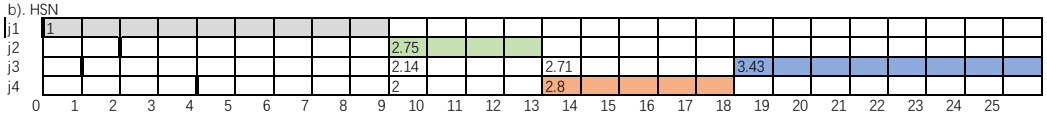
Problem 1.

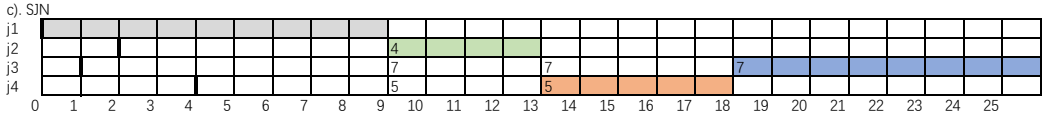
a). SRT



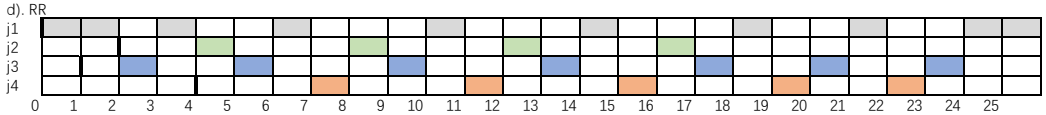
b). HSN



c). SJN



d). RR



e). response time = finish time - arrival time

response time = 25 - 0 = 25
response time = 6 - 2 = 4
response time = 17 - 1 = 16
response time = 11 - 4 = 7
avg response time = (25 + 4 + 16 + 7) / 4 = 13

response time = 9 - 0 = 9
response time = 13 - 2 = 11
response time = 25 - 1 = 24
response time = 18 - 4 = 14
avg response time = (9 + 11 + 24 + 14) / 4 = 14.5

response time = 9 - 0 = 9
response time = 13 - 2 = 11
response time = 25 - 1 = 24
response time = 18 - 4 = 14
avg response time = (9 + 11 + 24 + 14) / 4 = 14.5

response time = 25 - 0 = 25
response time = 17 - 2 = 15
response time = 24 - 1 = 23
response time = 23 - 4 = 19
avg response time = (25 + 15 + 23 + 19) / 4 = 20.5

13 < 14.5 < 20.5
so SRT achieve the best performance
in terms of average response time

f). slowdown = response time / service time

slowdown = 25 / 9 = 2.78
slowdown = 4 / 4 = 1
slowdown = 16 / 7 = 2.29
slowdown = 7 / 5 = 1.4
std = 0.7

slowdown = 9 / 9 = 1
slowdown = 11 / 4 = 2.75
slowdown = 24 / 7 = 3.43
slowdown = 14 / 5 = 2.8
std = 0.9

slowdown = 9 / 9 = 1
slowdown = 11 / 4 = 2.75
slowdown = 24 / 7 = 3.43
slowdown = 14 / 5 = 2.8
std = 0.9

slowdown = 25 / 9 = 2.78
slowdown = 15 / 4 = 3.75
slowdown = 23 / 7 = 3.29
slowdown = 19 / 5 = 3.8
std = 0.4

0.4 < 0.7 < 0.9
so Round-Robin achieve the best fairness

Probem 2.

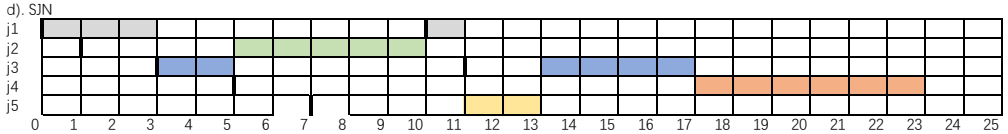
a).

Job ID	Job Length	Arrival time
1.1	3	0
1.2	1	10
2.1	5	1
3.1	2	3
3.2	4	11
4.1	6	5
5.1	2	7

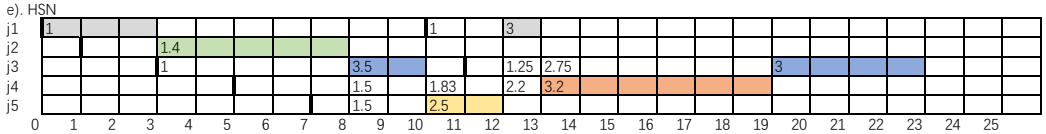
b). Because the scheduling is preemptive
only SRT is preemptive, and plug in SRT to prove,
the shorest remaining time job is always been chosen to execute first

c). At time 11, the remaing time of job 1.1 and 1.2 are 0, because they have finished executing,
job 2.1 is 5 -3 = 2,
job 3.1 has finished executing, job 3.2 just arrided, so the remaining time = length = 4
job 4 was arrived, but has not started executed yet, so the remaining time = length = 5
job 5.1 has finished executing
2 < 4 < 5, so 2.1 execute first

d). SJN

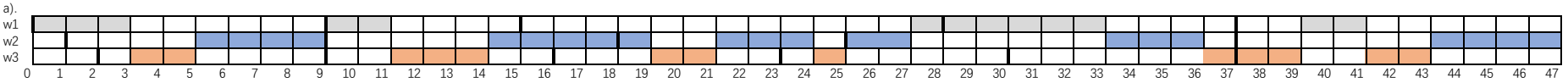


e). HSN



Problem 3.

a).

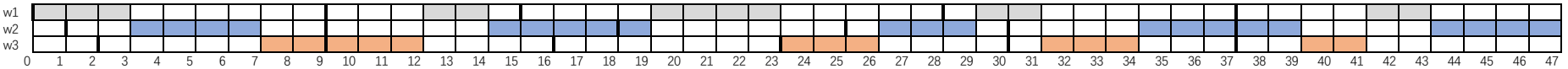


order: w1.1 -> w2.1 -> w3.1 -> w1.2 -> w3.2 -> w2.2 -> w3.3 -> w2.3 -> w3.4 -> w2.4 -> w1.3 -> w1.4 -> w2.5 -> w3.5 -> w1.5 -> w3.6 -> w2.6

b).

	C(0)	C¯(0)	C(1)	C¯(1)	C(2)	C¯(2)	C(3)	C¯(3)	C(4)	C¯(4)	C(5)	C¯(5)
w1	NaN	NaN	3	3	2	2.5	4	3.25	2	2.63	2	2.31
w2	NaN	NaN	4	4	5	4.5	3	3.75	2	2.88	3	2.94
w3	NaN	NaN	2	2	3	2.5	2	2.25	1	1.63	3	2.31

FIFO



SJN

order: w1.1 -> w2.1 -> w3.1 -> w3.2 -> w1.2 -> w1.3 -> w3.3 -> w2.2 -> w3.4 -> w2.3 -> w1.4 -> w3.5 -> w2.4 -> w2.5 -> w3.6 -> w1.5 -> w2.6

c). response time = finish time - arrival time

	1	2	3	4	5	6
w1	3	2	16	5	4	/
w2	8	10	6	2	6	10
w3	3	5	5	2	9	6

avg response time = 6

	1	2	3	4	5	6
w1	3	5	8	3	6	/
w2	6	10	11	11	9	10
w3	7	3	9	3	4	4

avg response time = 6.5882353

so did not know the future caused a perfermance degrations in terms of average response time by
6.59 - 6 = 0.59

d). w1 avg request length = 2.6
w2 avg request length = 3.5
w3 avg request length = 2.17
so website 3 statistically receives shorter-ived requests

slowdown = response time / service time

	1	2	3	4	5	6
s1	1.5	1.67	2.5	2	3	3
s2	3.5	1	4.5	3	1.33	2

so the schedule's inability to predict the future increases the slowdown of 3 requests for website 3

e). α = 0.3

	C(0)	C¯(0)	C(1)	C¯(1)	C(2)	C¯(2)	C(3)	C¯(3)	C(4)	C¯(4)	C(5)	C¯(5)
w1	NaN	NaN	3	3	2	2.7	4	3.09	2	2.76	2	2.53
w2	NaN	NaN	4	4	5	4.3	3	3.91	2	3.34	3	3.24
w3	NaN	NaN	2	2	3	2.3	2	2.21	1	1.63	3	2.04

total prediction error = 13.4

α = 0.5

	C(0)	C¯(0)	C(1)	C¯(1)	C(2)	C¯(2)	C(3)	C¯(3)	C(4)	C¯(4)	C(5)	C¯(5)
w1	NaN	NaN	3	3	2	2.5	4	3.25	2	2.63	2	2.31
w2	NaN	NaN	4	4	5	4.5	3	3.75	2	2.88	3	2.94
w3	NaN	NaN	2	2	3	2.5	2	2.25	1	1.63	3	2.31

total prediction error = 14.2

α = 0.8

	C(0)	C¯(0)	C(1)	C¯(1)	C(2)	C¯(2)	C(3)	C¯(3)	C(4)	C¯(4)	C(5)	C¯(5)
w1	NaN	NaN	3	3	2	2.2	4	3.64	2	2.33	2	2.07
w2	NaN	NaN	4	4	5	4.8	3	3.36	2	2.27	3	2.85
w3	NaN	NaN	2	2	3	2.8	2	2.16	1	1.23	3	2.65

total prediction error = 16.2

Yes, we can find a better value for α
13.4 < 14.2 < 15.2
so α = 0.3 closet match with what we draw in Part a)