

Solutions to Hw11 Section B

1) a) Prob 8.3) Assume $f_1=6.f_2$

From 8.2

$$v_1 = \sqrt{f_1}/[\sqrt{f_1}+\sqrt{f_2}].V = 0.71.V$$

$$v_2 = \sqrt{f_2}/[\sqrt{f_1}+\sqrt{f_2}].V = 0.29.V$$

$$v_1/v_2 = \sqrt{f_1/f_2} = \sqrt{6} = 2.45$$

b) Prob 8.4) It is not possible to tell since there is no info regarding the flow of the items.

c) Prob 8.9) a) $f_1 = 2000/200*2 = 20 \text{ ft}^3/\text{month}$

$$f_2 = 1200/6*7 = 1400 \text{ ft}^3/\text{month}$$

$$f_3 = 4000/10*1 = 400 \text{ ft}^3/\text{month}$$

$$v_1 = \sqrt{20}/[\sqrt{20}+\sqrt{1400}+\sqrt{400}] = 0.722 \text{ ft}^3$$

$$v_2 = 6.04 \text{ ft}^3$$

$$v_3 = 3.23 \text{ ft}^3$$

$$b) f_1/v_1 = 20/0.722 = 27.67 \text{ times/month}$$

$$f_2/v_2 = 231.56 \text{ times/month}$$

$$f_3/v_3 = 123.77 \text{ times/month}$$

c) equal space means $v_i = 10/3$

$$f_1/v_1 = 6 \text{ times/month}$$

$$f_2/v_2 = 420 \text{ times/month}$$

$$f_3/v_3 = 120 \text{ times/month}$$

d) Prob 8.11

$$\text{savings, } s = 0.25 - 0.15 = \$0.1/\text{pick}$$

$$c_r = \$1/\text{restock}$$

$$\text{viscosity, } vis_1 = 1000/\sqrt{20} = 223.6$$

$$vis_2 = 300/\sqrt{1400} = 8.01$$

$$vis_3 = 250/\sqrt{400} = 12.7$$

Check whether item 1 results in any savings:

$$c_1(v) = 0.1*1000 - 1*20/10 = 98$$

Check whether item 3 results in any savings:

$$v_3 = \sqrt{400}/[\sqrt{20}+\sqrt{400}] * 10 = 8.17$$

$$c_3(v) = 0.1*300 - 1*400/8.17 = -18.95, \text{ item 3 does not go to fast-pick area}$$

Item 2 does not go to fast-pick area, already implied by item 3.

Therefore only item 1 is in fast-pick, the number of restocks for item 1 is $20/10 = 2$ and total savings is 98.

2)

a) Lot for lot policy is not feasible because demand exceeds capacity in some periods.

b)

Week	1	2	3	4	5	6	7	8	9
Requirements	100	130	50	70	90	200	170	20	60
Capacity	120	120	120	100	120	120	150	80	100
Production	110	120	90	100	120	120	150	20	60
Inventory	10	0	40	70	100	20	0	0	0

Holding cost = $240 \times 1 = 240$

Setup cost = $9 \times 200 = 1800$

c) Setup cost = 200

Holding cost = 1/part/week

Week	1	2	3	4	5	6	7	8	9
Requirements	100	130	50	70	90	200	170	20	60
Capacity	120	120	120	100	120	120	150	80	100
Production	110	120	90	100	120	120	150	20	60
Excess capacity	10	0	30	0	0	0	0	60	40

If we shift production at period 9 to period 8

Holding cost = $1 \times 60 = 60$

Setup cost = 200 => make the change

Week	1	2	3	4	5	6	7	8	9
Requirements	100	130	50	70	90	200	170	20	60
Capacity	120	120	120	100	120	120	150	80	100
Production	110	120	90	100	120	120	150	80	0
Excess capacity	0	0	30	0	0	0	0	20	
Inventory	10	0	40	70	100	20	0	60	0

It is not possible to make any further shifts since we don't have sufficient capacity

Setup cost = $8 \times 200 = 1600$

Holding cost = $240 + 60 = 300$

Cost savings = $2040 - 1900 = 140$