Solutions to Hw11 Section B

1) a) Prob 8.3) Assume f1=6.f2

From 8.2
\[ v_1 = \frac{\text{sqrt}(f_1)}{\sqrt{f_1} + \sqrt{f_2}} \cdot V = 0.71 \cdot V \]
\[ v_2 = \frac{\text{sqrt}(f_2)}{\sqrt{f_1} + \sqrt{f_2}} \cdot V = 0.29 \cdot V \]
\[ \frac{v_1}{v_2} = \sqrt{\frac{f_1}{f_2}} = \sqrt{6} = 2.45 \]

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) \( f_1 = \frac{2000}{200} \times 2 = 20 \text{ ft}^3/\text{month} \)
\( f_2 = \frac{1200}{6} \times 7 = 1400 \text{ ft}^3/\text{month} \)
\( f_3 = \frac{4000}{10} \times 1 = 400 \text{ ft}^3/\text{month} \)
\[ v_1 = \frac{\text{sqrt}(20)}{\sqrt{20} + \sqrt{1400} + \sqrt{400}} = 0.722 \text{ ft}^3 \]
\[ v_2 = 6.04 \text{ ft}^3 \]
\[ v_3 = 3.23 \text{ ft}^3 \]

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

savings, \( s = 0.25 - 0.15 = 0.1/\text{pick} \)
\( c_t = 1/\text{restock} \)
viscosity, \( \text{vis}_1 = \frac{1000}{\sqrt{20}} = 223.6 \)
\( \text{vis}_2 = \frac{300}{\sqrt{1400}} = 8.01 \)
\( \text{vis}_3 = \frac{250}{\sqrt{400}} = 12.7 \)

Check whether item 1 results in any savings:
\( c_t(v) = 0.1 \times 1000 - 1 \times 20/10 = 98 \)

Check whether item 3 results in any savings:
\( v_3 = \frac{\sqrt{400}}{\sqrt{20} + \sqrt{400}} \times 10 = 8.17 \)
\( c_t(v) = 0.1 \times 300 - 1 \times 400/8.17 = -18.95 \), 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)  
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   Holding cost = \(240 \times 1 = 240\)  
   Setup cost = \(9 \times 200 = 1800\)  

   c) Setup cost = 200  
   Holding cost = 1/part/week

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   If we shift production at period 9 to period 8
   Holding cost = \(1 \times 60 = 60\)
   Setup cost = 200 => make the change

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   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