Homework 9. Solutions

Q 1.

a. 4 Weeks

b, c.

<table>
<thead>
<tr>
<th>Weeks</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>End Item</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Predicted Demand</td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Requirement</td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scheduled receipts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-hand inventory</td>
<td>net Requirements</td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Phased Net Requirements</td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planned order Release (lot for lot)</td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Requirement</td>
<td>200</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>200</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scheduled receipts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-hand inventory</td>
<td>net Requirements</td>
<td>200</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>200</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Phased Net Requirements</td>
<td>200</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>200</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planned order Release (lot for lot)</td>
<td>200</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>200</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Part D

<table>
<thead>
<tr>
<th>Gross Requirement</th>
<th>200</th>
<th>600</th>
<th>450</th>
<th>900</th>
<th>1200</th>
<th>600</th>
<th>450</th>
<th>900</th>
<th>1200</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduled receipts</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-hand inventory</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>net Requirements</td>
<td>250</td>
<td>350</td>
<td>450</td>
<td>900</td>
<td>1200</td>
<td>600</td>
<td>450</td>
<td>900</td>
<td>1200</td>
<td>500</td>
</tr>
<tr>
<td>Time Phased Net Requirements</td>
<td>250</td>
<td>350</td>
<td>450</td>
<td>900</td>
<td>1200</td>
<td>600</td>
<td>450</td>
<td>900</td>
<td>1200</td>
<td>500</td>
</tr>
<tr>
<td>Planned order Release (lot for lot)</td>
<td>250</td>
<td>350</td>
<td>450</td>
<td>900</td>
<td>1200</td>
<td>600</td>
<td>450</td>
<td>900</td>
<td>1200</td>
<td>500</td>
</tr>
</tbody>
</table>

### Q 2.

Demand: 45 34 76 45 23 56  
Starting Inventory: 12  
Ending Inventory: 20  
h = 2  
K = 20

Net out starting and ending inventories to obtain  
R = (33, 34, 76, 45, 23, 76)

a. Silver Meal heuristic  

Period 1:  
C(1) = 20
C(2) = (20 + 68)/2 = 44
Stop.

Period 2:
C(1) = 20
C(2) = (20 + 152)/2 = 86
Stop.

Period 3:
C(1) = 20
C(2) = (20 + 90)/2 = 55
Stop.

Period 4:
C(1) = 20
C(2) = (20 + 46)/2 = 33
Stop.

Period 5:
PC(1) = 20
C(2) = (20 + 152)/2 = 86
Stop.

Therefore:

(33, 34, 76, 45, 23, 76)

b. Least Unit Cost

Period 1:
C(1) = 20/33 = 0.6060
C(2) = (20 + 68)/(67) = 1.3134
Stop.

Period 2:
C(1) = 20/34 = 0.58
C(2) = (20 + 152)/(110) = 1.5636

Period 3:
C(1) = 20/76 = 0.2631
C(2) = (20 + 90)/(121) = 0.9090

Period 4:
C(1) = 20/45 = 0.4444
C(2) = (20 + 46)/(67) = 0.9850

Period 5:
C(1) = 20/23 = 0.8695
C(2) = (20 + 152)/(99) = 1.7373

Therefore:

(33, 34, 76, 45, 23, 76)

Q 3.
Lot sizes could be determined by the EOQ formula, for example. This has the advantages of reducing the setups and balancing holding and setup costs. However, it could result in very lumpy demand patterns for lower level components.
Q 4.

a) Advantages of pull system with respect to push systems, in terms of WIP
   - Decreases inventory costs, through reduced inventories of WIP
   - Improves production efficiency
   - Locates quality problems quickly, as parts move in small batches

b) When nothing goes wrong and the JIT system (Pull system) is operating as planned, there is less waiting in the queues than in a push system so the items move through faster from start to finish.