1. **(6 points)** Answer briefly (one paragraph) the following questions about the “Big Depot Hurricane Planning Game”.
   a. **(2 points)** Two common decisions for disaster planning were analyzed in this case study: to contract and reserve inventory in advance, and to allocate the reserved inventory. Discuss other (at least two) important decisions to prepare and respond to a disaster in an efficient and timely way.
   b. **(2 points)** Demand uncertainty (size and location) was identified in this case study as a very important logistics challenge when planning for a disaster. Discuss other (at least two) logistics challenges that may not have been explicitly mentioned, but that could arise in disaster planning and response. How are these challenges similar or different from the ones faced during day-to-day operations of a company such as Big-Depot?
   c. **(2 points)** The given budget for the purchasing decisions in the Home Depot game is $950,000. If the budget is increased, what would happen with the minimum expected total purchasing cost (expected cost of reserved plus expedited quantities)? Explain.

2. **(18 points)** A company manufacturers item X. The product structure is described below. The number in parenthesis is the lead time for purchasing or making the given component.
   - **Item X:**
     - Composed of 1 unit of component A, 1 unit of component B and 2 units of component C.
   - **Component A (1 week):**
     - Composed of 2 units of component B and 1 unit of component D.
   - **Component B (2 weeks):**
     - Composed of 2 units of component D and 3 units of component E.
   - **Component C (2 weeks)**
   - **Component D (1 week)**
   - **Component E (1 week)**

   a. **(4 points)** Draw the product structure.
   b. **(2 points)** What is the lead time of making the item X from scratch? Explain.
   c. **(1 point)** The demand for item X for weeks 5-15 is given below. The company has an initial inventory of 20 units of item X and wants a final inventory of 30 units at the end of week 15. Determine the net demand for weeks 5-15 of item X.

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<thead>
<tr>
<th>Week</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
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</thead>
<tbody>
<tr>
<td>Demand</td>
<td>90</td>
<td>80</td>
<td>70</td>
<td>100</td>
<td>110</td>
<td>120</td>
<td>90</td>
<td>85</td>
<td>80</td>
<td>80</td>
<td>70</td>
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d. **(4 points)** Determine the planned order release (lot for lot) for component B.

e. **(2 points)** Determine the planned order release (lot for lot) for component D.
f. (5 points) Determine the planned order release (lot for lot) for component C. Consider that there is an initial inventory of this component of 200 units at week 1 and a scheduled receipt of 200 units in week 6 and another of 300 units in week 8.

3. (6 points) Another component used by the manufacturing company in Problem 2, Component Y, is imported from Europe and the order cost is $2,000. Given this high order cost, the company is analyzing to use an EOQ lot sizing instead of lot for lot. The cost of component Y is $350 per unit. The company uses an annual interest rate of 22% for holding inventory. Order lead-time is 2 weeks. Net requirements for this component are given below for weeks 5-15. Determine the planned order release (EOQ) for component Y. Assuming that the inventory holding cost is charged against the inventory at the end of each week, what are the ordering and inventory holding costs associated with this EOQ lot sizing strategy and the net requirements in the table below? Based on these costs, is it this EOQ lot sizing strategy better than a lot for lot sizing strategy for this component? Why?

<table>
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<tr>
<th>Week</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>Net requirements</td>
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<td>165</td>
<td>150</td>
<td>120</td>
<td>110</td>
<td>100</td>
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