CSE140 Homework #4 - Solutions

You must SHOW ALL STEPS for obtaining the solution. Reporting the correct answer, without showing the work performed at each step will result in getting 0 points for that problem.

Problem numbers are from ‘Digital Design and Computer Architecture (2nd Edition)’

1. Using the table from Exercise 2.28, do the following:
   a) Find the minimum SOP (equation only).
   Ans: AB + AD' + AC

<table>
<thead>
<tr>
<th>CD</th>
<th>AB</th>
<th>00</th>
<th>01</th>
<th>11</th>
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   b) Design a circuit implementing the function using a 4x1 MUX with A and B as inputs.
   Ans:

2. Design a circuit implementing the function from the table in Exercise 2.28 using a DEMUX and appropriate boolean logic with A, B, and C as control inputs.
   Ans: Terms into the 4-input OR gate that only contain A, B, and C are the corresponding outputs from the DEMUX.
3. a) Draw a K Map and find the minimal cover POS for the function given in the table.
oR: \((B' + C + D)(A' + C + D')(B + C' + D')(A + C' + D)\)

b) Are there any static-0 hazards? Please show them on your K Map using a dashed circle and write the equation that has no static-0 hazards.
   Ans: Terms with dashed/solid lines may be flipped. All dashed term groupings should be oriented in the same way as should all solid terms groupings.


4. Exercise 2.40
   Ans: \(A'B + B'C'D' + A'C'D'\)

5. Exercise 2.44
   Ans: Critical path: Inputs F/G to Y
   \[pd = 30 + 30 + 30 + 20 = 110 \text{ ps}\]

   Short path: Input D to Y
   \[pc = 15 + 25 + 15 = 55 \text{ ps}\]