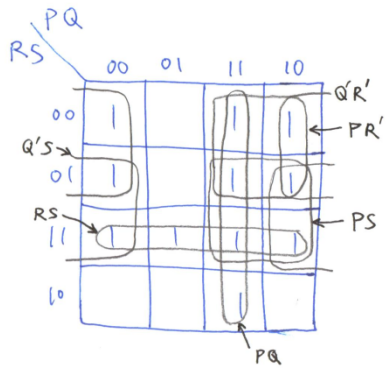
CprE 281 Recitation 05 Solutions

1. X'Y+XZ+YZ = X'Y+XZ+YZX+YZX' by 14a
   = X'Y+X'YZ + XZ+XZY by 10a and 10b multiple times
   = X'Y + XZ by 13a twice

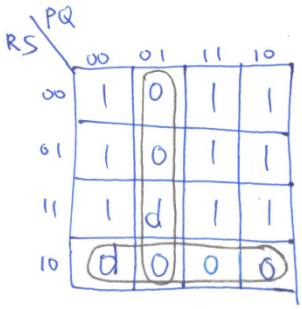
   Intuitively, YZ is partially covered by X'Y and partially covered by XZ.

2. QP + Q'R' + PR' = QP + Q'R'
   RS + R'P + SP = RS + R'P
   RS + R'Q' + SQ' = RS + R'Q'
   Hence, PR', SP and SQ' can be eliminated.
   Z = PQ + RS + Q'R'

3. Same expression as in Part 2.



4. Min-cost implementation is the canonical POS: Z = (P+Q')(R'+S).



5. Notice the similarity between the K-map of Z in Part 2 and F in Part 4.
   In order to minimize the number of AND gates,
   Z = PQ + RS + Q'R'
   F = PR' + RS + Q'R'
   There are only 4 distinct product terms.