

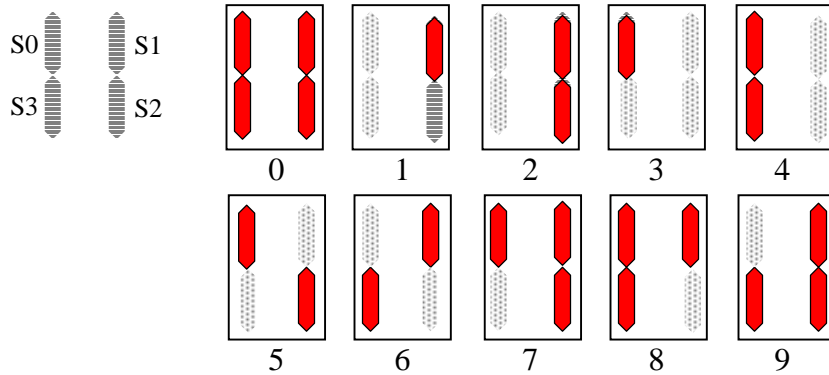
**University of California at Berkeley**  
**College of Engineering**  
**Department of Electrical Engineering and Computer Science**

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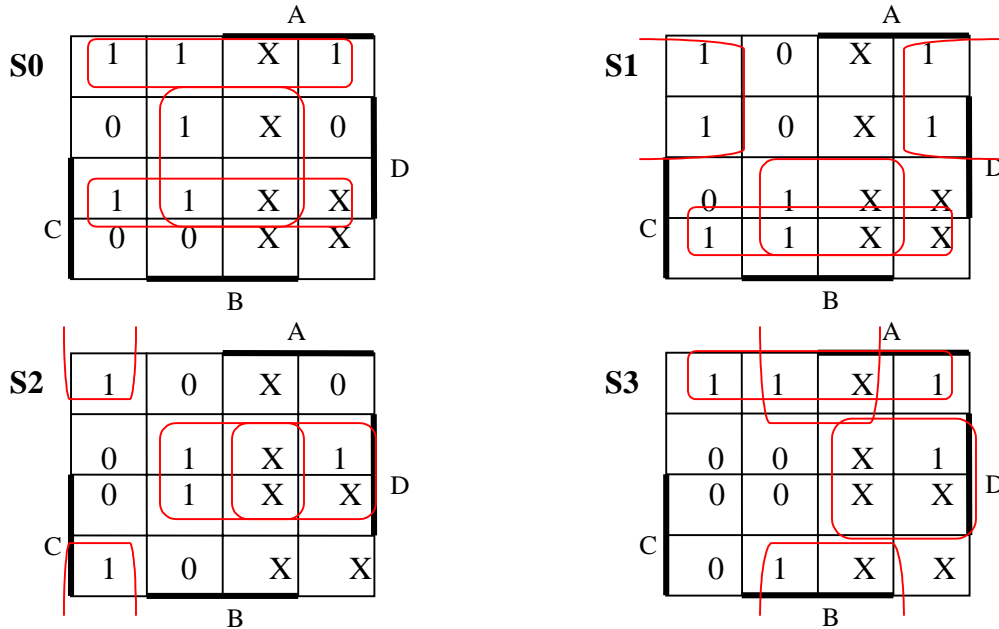
R. H. Katz

**Homework Quiz # 4 Solution**

Your job is to design a BCD-to-4 Segment Display controller to the following specification. The inputs are the decimal digits 0 through 9 encoded as 0000 through 1001 on the inputs A,B,C,D. The 4 Segment display has driver signals S0, S1, S2, S3 that when driven cause the indicated LED segment to illuminate. The encoding of the BCD digits is as follows:



Fill in the K-maps for S0, S1, S2, S3 and develop an implementation with the fewest possible products considered across all four functions (i.e., an implementation suitable for a PLA).



$S0 = C'D' + BD + CD$

$S2 = A'B'D' + AD + BD$

$S1 = B'C' + BC + CD'$

$S3 = AD + BD' + C'D'$

How many unique product terms in your solution?

9 :  $C'D'$ ,  $BD$ ,  $CD$ ,  $B'C'$ ,  $BC$ ,  $CD'$ ,  $A'B'D'$ ,  $AD$ ,  $BD'$