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Logic design (Fall 2021)

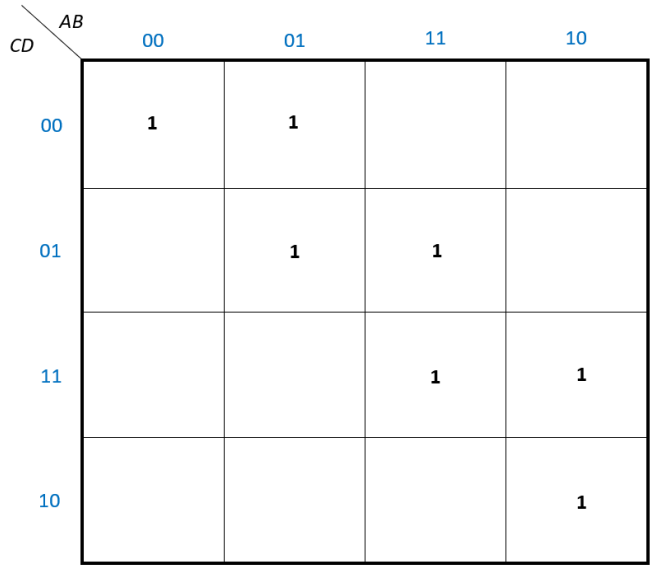
Quiz # 5

Name:_____ID:_____

1. Given F(A,B,C,D) = Σ m(0,4,5,10,11,13,15). Its Karnaugh map is as below.

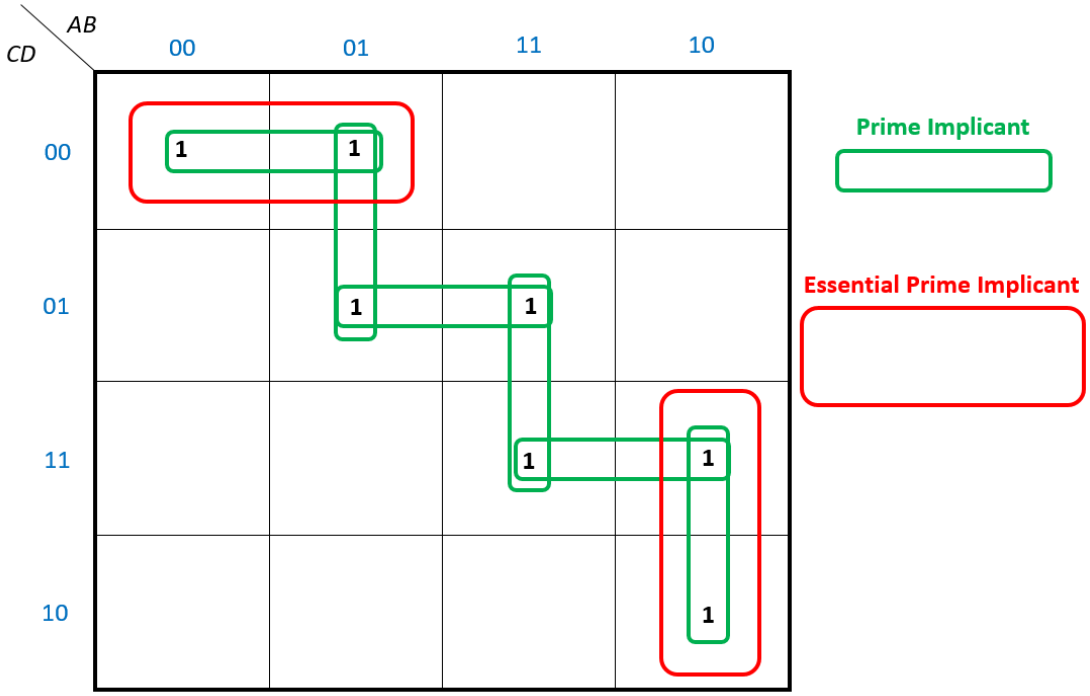
   (a)(15%)Find the “number” of prime implicants

   (b)(15%)Find the “number” of essential prime implicants



Ans: (a) 6

(b) 2

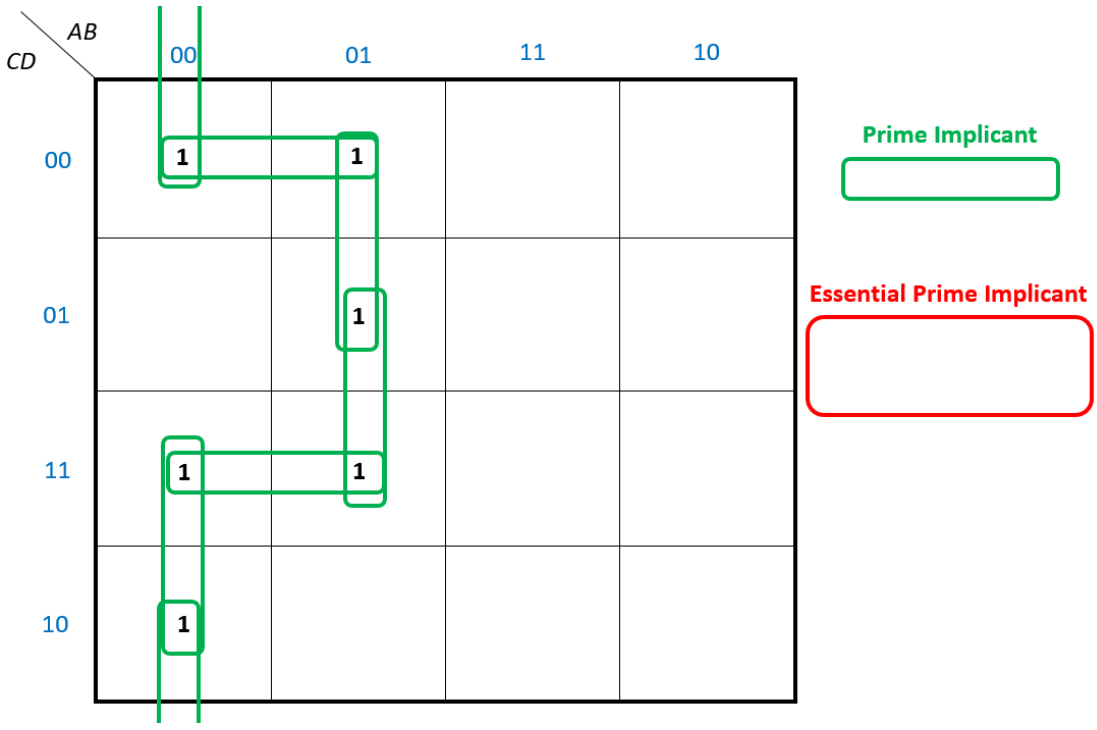


Given F(A,B,C,D) = Σ m(0,2,3,4,5,7).

CD \ AB	00	01	11	10
00	1	1		
01		1		
11	1	1		
10	1			

Ans: (a) 6

(b) 0



2. Given F(A,B,C,D,E) = Σ m(1,4,9,12,17,19,21,23,25,27,29,31)

   Given F(A,B,C,D,E) = Π M(0,2,3,5,6,7,8,10,11,13,14,15,16,18,20,22,24,26,28,30)

   Solve the problems below by using the given 5-variable Karnaugh map:

   (a) (40%) Find a minimum sum-of-products expression for F.

   (b) (30%) Find a minimum product-of-sums expression for F.

   Ans:

   (a) Each different(wrong) term would deduct 10 points

   F = A'CD'E' + C'D'E + AE

   e.g. F = A'CD'E' + ~~AC'D'E~~ + AE + ~~BC~~ → 40 - 20 = 20 (points)

   (b) Each different(wrong) term would deduct 10 points

   F = (C + E)(A + D')(A' + E)(A + C' + E')