

COE/EE 243

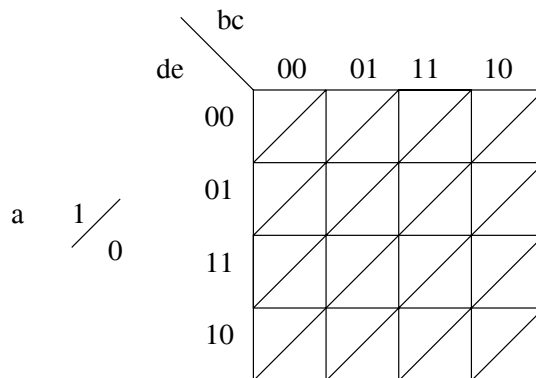
Sample Exam #2

From Fall 1998

Show your work. Do **NOT** use a calculator!

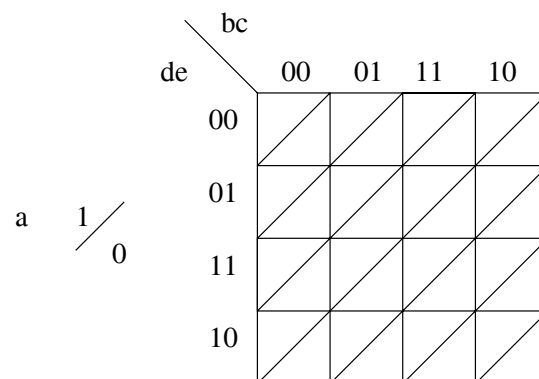
- (6 pts) For the function $f(A, B, C, D) = \sum m(1, 4, 6, 7, 8, 9, 10, 11, 15)$, list **all** of the prime implicants and indicate which of these are essential prime implicants.

- (4 pts) Fill in Karnaugh Map for the function
 $f(a, b, c, d, e) = ace + a'cd'e' + ac'de$
 with a function of don't care conditions given by:
 $d(a, b, c, d, e) = a'de' + a'd'e + ad'e'$

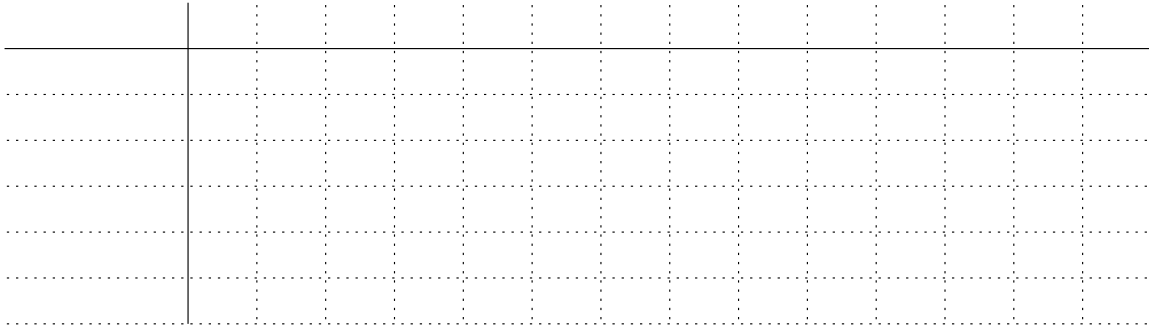


3. (6 pts) Use the Quine-McCluskey procedure to find all of the prime implicants for $f(a,b,c,d) = \sum m(3,7,9,14) + \sum d(1,4,6,11)$.

4. (6 pts) Loop all of the *essential prime implicants* on a Karnaugh map for $F(a,b,c,d,e) = \sum m(2,3,7,10,12,15,27) + \sum d(5,18,19,21,23)$.



7. (8 pts) Use a prime implicant chart to minimize the function $f(a, b, c, d) = \sum m(4, 5, 6, 8, 11, 13, 15)$ which has the following prime implicants: $a'bc'$, $a'bd'$, $bc'd$, acd , abd , and $ab'c'd'$



8. (4 pts) Indicate how a NAND gate can be used to implement:
- (a) An Inverter:
 - (b) An And Gate:
 - (c) An Or Gate:
 - (d) Because a NAND gate can be used to implement all three basic Boolean functions, how would we describe it?
9. (4 pts) Fill in Karnaugh Map for the function $f(a, b, c, d, e) = \prod M(1, 3, 6, 11, 15, 19, 20, 25, 27) \cdot \prod D(4, 9, 13, 16, 29, 31)$.

