

**ECE 465, Fall 2009, Instructor: Prof. Shantanu Dutt**

**Homework 2 : Due Thurs, Oct. 8**

1. Prob. 3.58 with the requirement that the least-cost set of PIs to cover all minterms should be determined using Petrick's algorithm and not the PI table part of QM; the set of all PIs are, however, to be determined using the first stage of the QM method. **50**
  
2. Prob. 3.60. Note that there should be a fifth variable  $E$  for the two functions for this problem (there is a typo in the text and only four variables  $A, B, C, D$  are given). **60**
  
3. Suppose we obtain all PIs of a function  $f$  using the 1st phase of the QM method. Determine whether the following rules/methods can cause the final solution to be non-optimal or whether they will always result in an optimal solution. Optimality is w.r.t. the total cost over all PIs selected to be in the final expression (cost of a PI = # of literals in its product expression + 1):
  - (i) The row covering rule of QM when the PIT or a subsequent RPIT is always acyclic. **75**
  - (ii) The heuristic rule for selecting a PI for inclusion when the PIT/RPI is cyclic. **75**
  - (iii) Petrick's method. **75**

Your comments should be supported by strong rationale and examples (the examples should not be "start-to-finish" examples, but clear and small intermediate situation examples of the PIT/RPIT, as discussed, for example, in the covering rules that were illustrated on the blackboard). In the cases that you analyze a method to be non-optimal, please also state which aspects of the method contributes to non-optimality, and why (again, use examples to make your points).

This is a thinking and analytically-oriented question. So think in-depth and clearly, and make a clear and analytical case for your conclusions in a manner suggested above.