1. (6 points) (6 points) Fill in the Karnaugh map below so that it corresponds to the function $F(A,B,C,D) = \Sigma m(2,3,5,6,12,13)$, $d(A,B,C,D) = \Sigma m(4,8,9,11,15)$. Derive a minimal product-of-sums expression for this function, taking full advantage of the don’t care conditions.

How many simple AND gates, OR gates and inverters are needed to implement your expression directly? How many transistors is this, assuming CMOS gates? How many four input LUTs are needed to implement the expression?
2. (4 points) A 1-to-8 demultiplexor has a data input $D$, eight data outputs $Q_0,...,Q_7$ and three control inputs $C_2,C_1,C_0$. Write a logic equation for $Q_6$ as a function of $D,C_2,C_1$ and $C_0$.

How many 4 input LUTs are needed to implement the complete demultiplexor?