

Computer Science 03 – 60 – 265 Assignment #3
 Due date is Monday March 12th 2012 by 08:30am
 (submit to me in classroom)

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Clearly show the steps of your answer for each question below
 (total is 80 points)

1. Let $f(w, x, y, z) = \sum m(1, 3, 8, 11, 12, 13, 15)$ and $d(w, x, y, z) = \sum m(7, 9)$.
 $\{d(w, x, y, z)$ defines the *don't care conditions* of $f\}$.
 - (a) (10pts) Find the minimal SOP of f .
 - (b) (10pts) Find the minimal POS of f by the *direct method*.

2. Let $f(w, x, y, z) = \prod M(4, 9, 12, 13, 14)$ and $d(w, x, y, z) = \sum m(5, 6, 11, 15)$.
 $\{d(w, x, y, z)$ defines the *don't care conditions* of $f\}$.
 - (a) (10pts) Find the minimal SOP of f by the *complement method*, (see page 12 of lecture #4).
 - (b) (10pts) Find the minimal POS of f .

3. (20 points)]You are to design a minimal circuit with three inputs and two outputs given the following specification. The inputs are called $x_2x_1x_0$ and represent a 3-bit integer in UBI form. The output is called s_1s_0 , and represents the number of bits that are equal to 1 in the 2's complement of $x_2x_1x_0$. A truth table and a K-maps are provided for your convenience only.

x_2	x_1	x_0	s_1	s_0
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

4. Design a Full-Subtractor circuit.