CS120A – Homework #2

Spring 2003. Professor Hwang

Given May 6, 2003. Due May 13, 2003 at the beginning of class.

No late homework accepted.

Your work must be completely typeset with a word processor. Circuit diagrams can be drawn using any drawing program or by hand but it must be very neat. Handwritten works will **NOT** be accepted. (16 points total)

1. Draw the carry-look-ahead circuit for C_3 only. Show your work on how the equation for C_3 is derived. (4)

2. Draw the complete 3-bit ALU circuit having the following operations. The ALU circuit outputs a 0 if the operation cannot be performed. Use K-maps to reduce all the equations to standard form. (4)

S_2	S_1	S_0	Operation
0	0	0	Pass A through the LE
0	0	1	Pass B through the LE
0	1	0	Pass A through the AE
0	1	1	Pass B through the AE
1	0	0	A – 1
1	0	1	A + 1
1	1	0	B – 1
1	1	1	B + 1

3. Draw the circuit for the 4-to-16 decoder using only 2-to-4 decoders. (4)

4. Assume that we have two components U_1 and U_2 whose operations are defined according to the truth tables below. Both of these components have two inputs and one output. Derive and draw the circuit for the tri-state buffer using these two components. Be careful that no short circuits are created anywhere in the circuit. Note that a Z value combined with a 0 gives a 0, and when combined with a 1 gives a 1. (4)

U_1

E	In	Out
0	×	Z
1	0	0
1	1	Z

U_2

E	In	Out
1	×	Z
0	0	Z
0	1	1

Logic symbols:

In —— U_1 —— Out

E

In —— U_2 —— Out

E