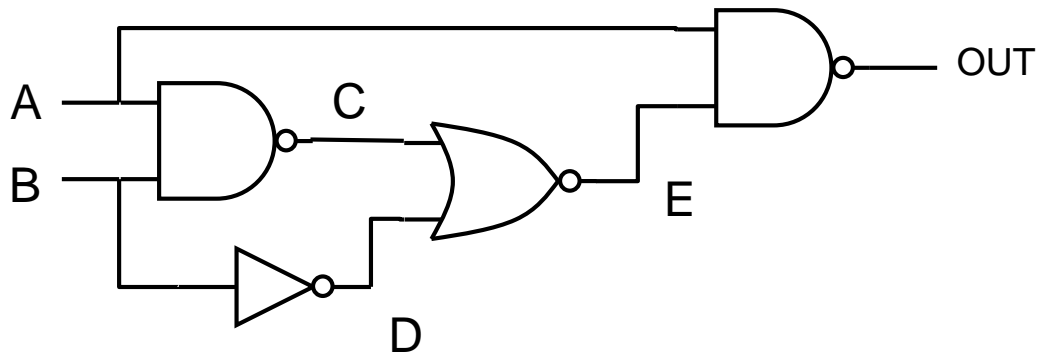# ELE 455/555
Spring 2016

Homework 1

Due 1/26

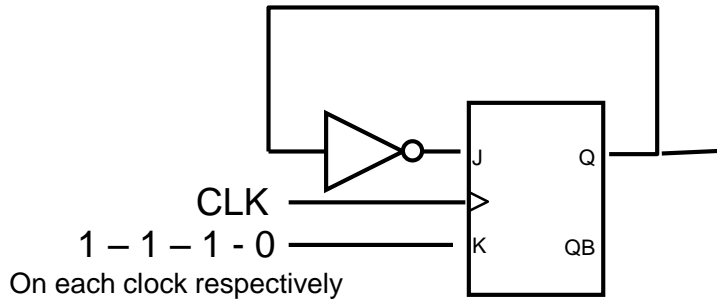## Beginning of Class

1 - create a full truth table for the following circuit – 10pts

(be sure to include all intermediate nodes)

A

B

C

D

E

OUT

2 – Create a transition table and determine the value of Q after each clock cycle – 10pts

(Assume Q = 0 initially)

CLK

1 – 1 – 1 - 0

On each clock respectively
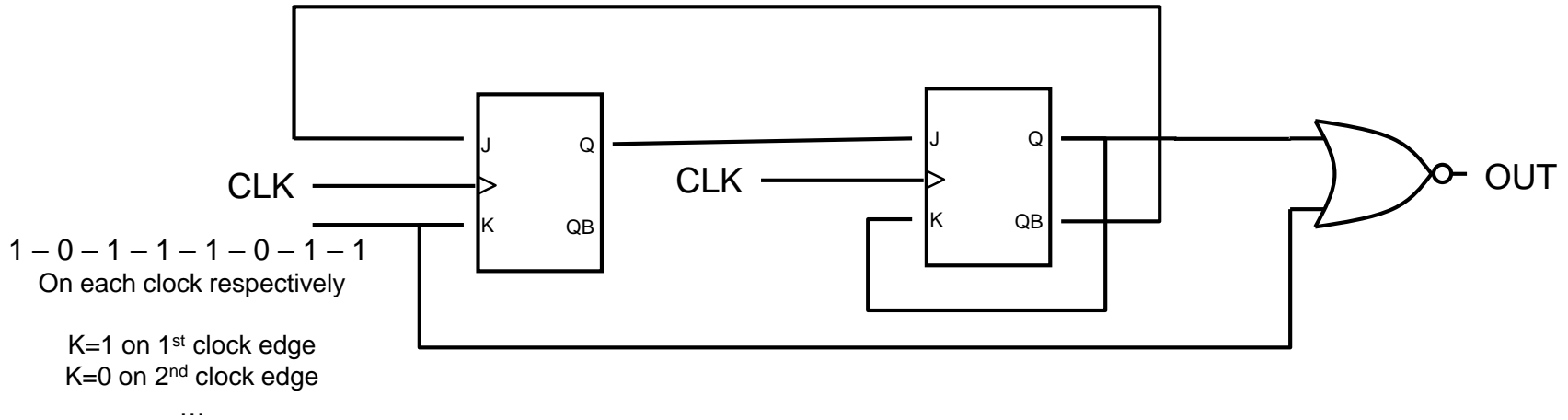
K=1 on 1st clock edge
K=1 on 2nd clock edge
K=1 on 3rd clock edge
K=0 on 4th clock edge

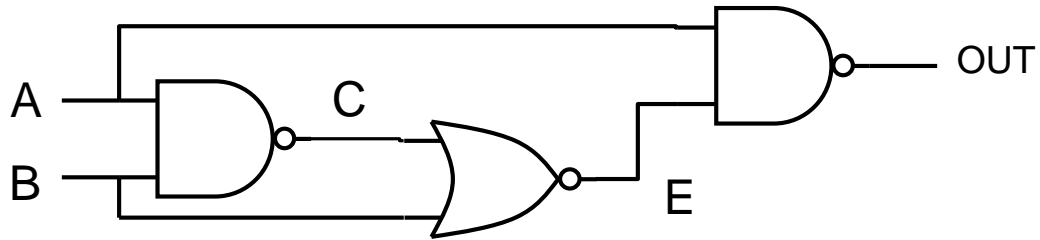3 – Create a transition table and determine the value of OUT after each clock cycle – 10pts

(Assume both Qs = 0 initially)

CLK

CLK

OUT

1 – 0 – 1 – 1 – 1 – 0 – 1 – 1
On each clock respectively

K=1 on 1st clock edge
K=0 on 2nd clock edge
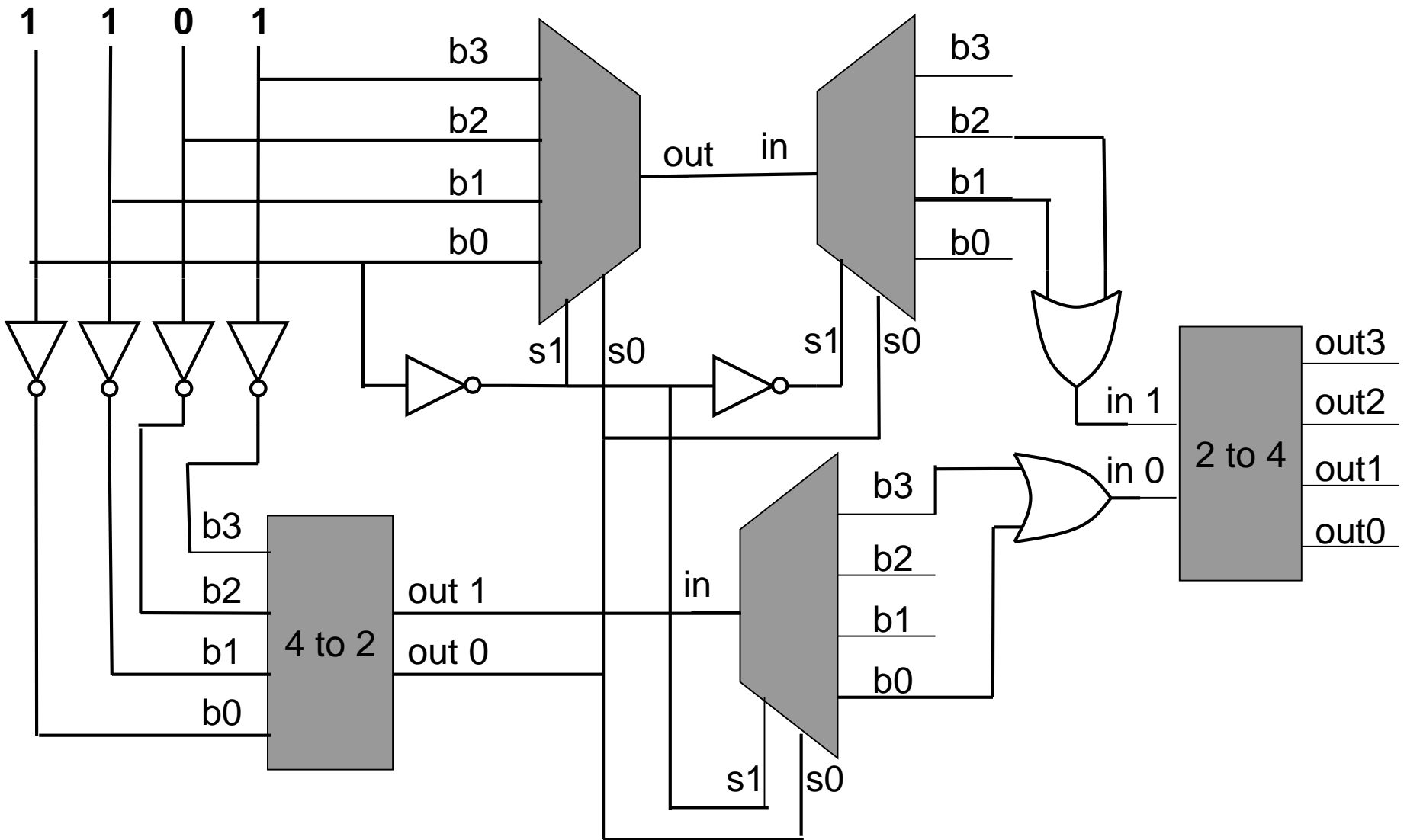…

4 - Write the logic equation for the circuit below (in minimum SOP or POS form)
  – 10pts

5 – Determine the output values – 10pts
(show your work)

6 – Write each of the following numbers using the designated representation you must show your work – 10pts

77 (unsigned 8bit binary)

-77 (8 bit binary sign magnitude)

-77 (8 bit 2's complement)

-77 (hex)

77 (8 bit 2's complement)

7 - Write each of the numbers in the designated representation in base 10
    you must show your work - 10pts

1001 0101 (BCD) → decimal

1101 0111 (2's complement) → decimal

1101 0101 (sign/mag) → decimal

3C (hex) → decimal

0101 0111 (2's complement) → decimal

8 - Write -12.875 using standard floating point notation
you must show your work – 10pts

Work:

$12.875_{10} = 1100.111_2$

$12 = 1100_2$, $\quad 0.875 = 0.111_2$

Normalize: $1100.111 = 1.100111 \times 2^3$

Sign bit $= 1$ (negative)

Exponent $= 3 + 127 = 130 = 10000010_2$

Mantissa $= 100111000000000000000 00$

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	1	0	0	0	0	0	1	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

9 – do the following using 8 bit 2's complement arithmetic
you must show your work –

5 + 12 =

15 – 8 =

23 – 51 =

-5 – 15 =

-15 + 66 =

10 – do the following using 8 bit 2's complement arithmetic
        you must show your work – 10pts

15 x -9 =

-6 x -12 =