

Name: \_\_\_\_\_

CS370: Introduction to Digital Design

Instructor: B. Hemingway

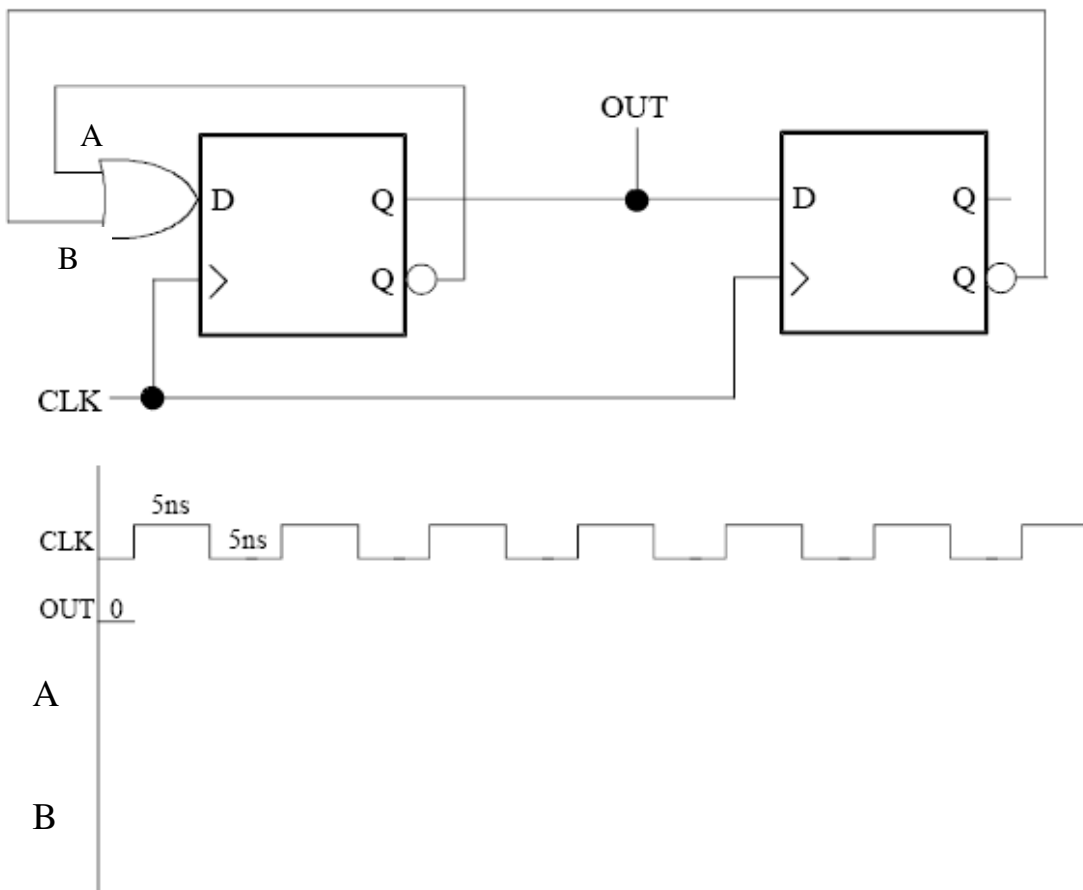
# Quiz #3 TAKEHOME

Due in class on February 27, 2008

## Quiz Policy:

No calculators, no collaboration. Your solutions are due at the end-of-class. Please write your answers on this sheet (front and back).

1. You are given the following circuit



(a) (10 pts) Assuming a clock input as shown, and that  $OUT = (\text{logic } 0)$  at time  $t = 0\text{ns}$ , draw a timing diagram. Label and draw OUT's timing, and also show the timing for any internal nodes that you use to derive OUT.

(b) (5 pts) **What is OUT's duty cycle?** \_\_\_\_\_

2. (15 pts) Using **only** two 4-bit adders construct a circuit to compute the expression  $2x + 3y + z$  where  $x$  is a 2-bit number ( $x_0$  and  $x_1$ ),  $y$  is a 2-bit number ( $y_0$  and  $y_1$ ), and  $z$  is a 1-bit number ( $z_0$ ). The 4-bit adders have two 4-bit numbers and a carry as inputs and a 4-bit sum and a carry as output. Make sure to clearly label all inputs and outputs. **BE NEAT AND CLEAR.**

