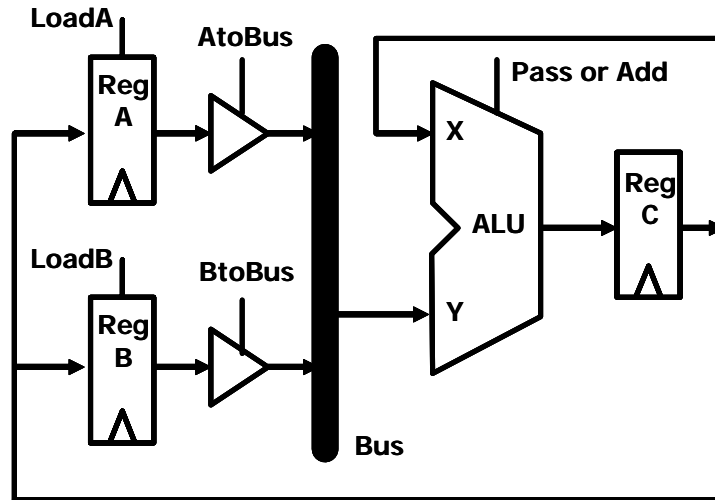


CSE370 Quiz 4 (7 March)

Name _____

You are given the data-path below. Note that there are three registers. Two of these have a load control input, while the other loads a new value on every clock cycle. There are two tri-state drivers that connect the outputs of registers A and B to a common bus. Finally, there is an ALU that can perform two operations: pass Y, add X and Y. X is always the output of register C, while Y is the value on the bus.



(a) Show the register-transfer operations needed to implement an instruction that swaps the contents of the A and B registers (SWAP A, B). Make sure to clearly indicate how many states will be needed to implement the instruction and the value of each control signal in each state. Assume the instruction is already in the instruction register so there is no need to worry about fetching the instruction or incrementing a program counter.

cycle	register-transfer operations	AtoBus	BtoBus	ALU	LoadA	LoadB
1	$C \leftarrow A$	1	0	Pass	0	0
2						
3						

(b) Show the register-transfer operations needed to implement an instruction that doubles the contents of the A register (TWOX A). Make sure to clearly indicate how many states will be needed to implement the instruction and the value of each control signal in each state. Assume the instruction is already in the instruction register so there is no need to worry about fetching the instruction or incrementing a program counter.

cycle	register-transfer operations	AtoBus	BtoBus	ALU	LoadA	LoadB
1						
2						
3						