Assignment 1

提交作业

截止时间 3月 11， 23:59 之前 **得分** 100 **提交** 一个文本输入框 or 一份上传文件
文件类型 pdf

1. What is the different between Princeton architecture and Harvard architecture?

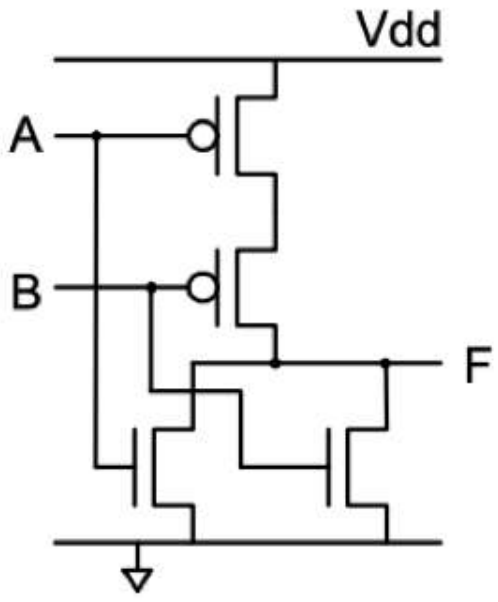
2. In 2017, the ACM Turing Award was awarded to David A Patterson and John L. Hennessy for their invention of which type of ISA (CISC or RISC)?

3. If the CPU can do one addition of two 32-bit values for every 1 ns, and a memory transfer takes 8 ns, how would you design the memory interface (data bus width) and why?

4. Please rank the size and access time of memory structures in the computers: cache, disk, register, main memory.

5. List the difference between address bus, data bus, and control bus. Which one determine the memory capacity?

6. Can you derive the truth table for the following CMOS circuit?



7. Suppose a following C program:

```
int result = b = 0;

int array[1000];

for (int i = 0; i < 1000; i ++)

  result = array[i] + b;
```

Suppose a CISC CPU can execute the program with 100 instructions per second while a RISC CPU can execute the program with 150 instructions per second. Can you determine which CPU is able to finish the program faster? Why? (You can assume all variables first exist in the main memory. Since we haven't taught the details of CISC/RISC, one general rule that you can use is that the CISC instruction is more complex than the RISC instruction. For example, a CISC add instruction can operate on the main memory address directly while the RISC add instruction can only operate on the register.)

8. For the same C program:

```
int result = b = 0;

int array[1000];

for (int i = 0; i < 1000; i ++)

  result = array[i] + b;
```

You can assume all variables first exist in the main memory. We have taught in the class that the register is faster to access than the main memory. But register capacity is limited. If you want to select several variables to put in to the register, which variable(s) would you choose?