

CS2026 ASSIGNMENT 4 (Due Date: April 3, 2026)

Instructions: You have to answer all of them. Put your answers in a MS WORD file, or other word processing file, and then submit the file to the course Gmail account.

1 Information System

1. Today, many application software (equivalently, application systems) can be found in either a Windows-based computer or MacOS-based computer. During the lecture, John Sum has mentioned four of them which can commonly be found in a Windows-based computer. State the names of these application systems and describe in simple words their usages.
2. State the definition of an *information system*.
3. In accordance with the above definition, a commercial computer in the 1950s could only support three functions. What are they?
4. Did information system exist in 400 years ago?
5. Describe three methods how information could be transmitted in the 16 century.
6. In the 16 century, many countries could encounter invasions from their neighboring countries. In that period of time, a special method was applied in sending the invasion information from the invasion point (like a town or city) to the King. What is this method?
7. In the class, John Sum has mentioned that everyone of us is able to manage personal information. We might use a smartphone together with a notebook computer to manage those information. State five information which are managed by you.

2 Computer & Telecomm Network

1. The NCHU campus network is a local area network (LAN). A number of computers are wired connected, in which their data communications are conducted by the wired communication technologies. Clearly, smartphones and notebooks can also be connected to the NCHU network via

the WiFi access points. Their data communications are conducted by wireless communication technologies. In term of transmission rate, which communication technology supports higher rate?

2. What is the highest data transmission rate in today computer network? State your answer in term of bit per second (bps).
3. What is the highest data transmission rate in today telecommunication network, like 5G or 6G technology? State your answer in term of bit per second (bps).
4. Internet is a platform to support data communication. Telecommunication network is a platform to support both data and voice communication. Was data communication technology invented earlier than voice communication technology?
5. State the reason(s) why wireless communication technology is important. Note that its importance is not just for today but also for the time in the 1900.

3 Logic Gate

1. What is the typical size of a logic gate in 1940s computer?
2. What is the typical size of a logic gate in today processor, like Intel Core i9 processor?
3. Roughly, how many logic gates was in ENIAC?
4. Roughly, how many logic gates is in an Intel Core i9 processor?
5. The first commercial computer was available in the 1950s. What was its primary use, data processing or word processing?
6. Before 1970s, commercial computers were expensive. Not all firms could afford. Around which period of time, a small & medium size enterprise (SME) was able to afford for a computer?
7. Figure 1 shows a three-input-two-output logic circuit. Each input (resp. output) can only be either '0' or '1'. Fill up the missing outputs in the following truth table.

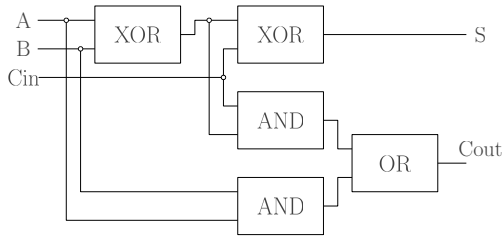


Figure 1: A three-input-two-output digital logic circuit.

A	B	C_{in}	C_{out}	S
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

- If you can only implement the digital logic circuit as shown in Figure 1 by NAND gates, what is the digital logic circuit design? How many NAND gates are needed in your design? [Note: You do not have to give the best design.]

4 Processor

- Today, many technology firms have designed CPU. State five of them.
- Their designs basically follow three different architectures. One of them is called ARM architecture. State the full name of this architecture.
- State the names of the other two architectures.
- Generally speaking, is the number of instructions supported by an Nvidia GPU larger than the number of instructions supported by an Intel Core i9 processor?
- The nominal clock speed an Intel Core i9 processor is 5G Hz. Does it mean that the processor can complete 5×10^9 instructions in a second?
- A typical processor must consist of two units in it. One is called a control unit. The other is called arithmetic logic unit (ALU) which consists of a module of logic gates. What is the function of the control unit?
- State the numbers of CPUs and GPUs in an Apple M1 processor.