

CS2026 ASSIGNMENT 3 (Due Date: March 27, 2026)

Instructions: This assignment consists of two parts. Part I consists of twenty questions about the BBC documentary. Part II consists of five questions about the content in the lecture note on the history of computer. 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.

While you are answering the questions, please follow the following format for the question number.

- Q1.3.1 refers to the question 1 under the subsection 1.3.
- Q5.1 refers to the first question under the section 5.

1 Part I: Documentary

To answer the following questions, you need to watch the following documentaries whose links are available on the course homepage under the heading 'History of Computer'.

- A demo of Charles Babbage's Difference Engine.
- BBC Documentary 1991 Edition.
- Computer History ENIAC: Starting up the ENIAC.

1.1 Difference Engine

1. What special type mathematical problems the Charles Babbage's difference engine was designed for?
2. How to drive the difference engine to perform computing?
3. Is the difference engine an electronic computing machine?

1.2 BBC Documentary

1. After World War II, Alan Turing was involved in the design of a stored-program computer based on his conceptual model introduced in 1930s. What is the name of this computer?
2. What is the title of the paper in which Alan Turing presented the idea of computing machines (i.e. the conceptual model of a computer)?

3. The work done by Alan Turing in code breaking during the World War II was kept in secret for decades. Around in which year, his contribution in WWII was disclosed?
4. What was the cause of the death of Alan Turing in 1954?
5. After WWII, John Mauchly and J. Presper Eckert in US started a venture on making commercial computers. However, people were skeptic on this. In the video, two skeptical reasons have been mentioned. What are they?
6. John Mauchly and J. Presper Eckert named the computer to be made the UNIVAC. What is the full name of this machine?
7. In UK, the first commercial computer was designed and built by a company called Lyon. What businesses Lyon was famous for?
8. In 1947, Lyon got experts from academic to design and build the computer. From which university, the Lyon got the experts?
9. In which year, Lyon started a new product line called "Computers"?
10. In US, Eckert-Mauchly Computer was finally sold to Remington Rand. A new division under Remington Rand was created to continue on the Eckert and Mauchly computer project. What is the name of this new division?
11. In which year, UNIVAC was used for the prediction of the outcome of the US president election?
12. By the end of 1953, how many UNIVAC machines had been installed?
13. What are the social effects of computers in factory and office automation?
14. When did Apple design her first computer?
15. When was the device 'mouse' designed and who designed it?
16. Why Xerox did not make computer?
17. What is ALTAIR 8800 and when did it appear in the market?
18. When did IBM design her first personal computer?

19. Apart from expensive pricing, what other factor led the first generation of IBM PC fail in the market?
20. What is the key feature of Macintosh making it very difference from other PCs appeared in 1984?

1.3 ENIAC

1. Which two scholars are the chief engineers for the ENIAC?
2. What is the full name of ENIAC?
3. Where was this computer located?
4. What is the use of the ENIAC in the WWII?
5. Is ENIAC an electronic computer?

2 History of Computers (PPT)

1. With reference to the lecture slides, what major inventions or technological advancements led to the realizations of the first, second, third and fourth generations of electronic computers?
2. State the evolution of the methods of controlling an operating system from the fifth to the seventh generation of computers.
3. State the names of two conceptual computer models which were proposed in the earlier 20th century. One of them was introduced by Alan Turing. What is the name of the scholar who introduced the second conceptual model?
4. Today, almost all computers their architectures follow one of these conceptual models. Which one is it?

3 ASCII Coding

In the lecture, John Sum has introduced the concept on encoding characters.

1. With reference to the ASCII coding scheme, how many bits are used for encoding an English character?
2. With reference to the ASCII coding scheme, what is the binary code for the string 'John Sum'? Note that there are eight characters in the string.
3. Using ASCII code, how many bytes are needed for storing the following message?

123456789

12345

12

Note that the message starts from the first dash and ends by the last dash.

4. What language(s) characters can be supported by ASCII code?
5. State three special characters their codings are included in ASCII code.
6. How many characters the ASCII code can encode?
7. What are the four-bit binary patterns for symbols 'A', 'B', 'C', 'D', 'E' and 'F' in hexadecimal coding?

4 Units

In the lecture, John Sum introduced some units for specifying the size of a memory space.

1. What are the exact numbers the units Ki, Mi, Gi and Ti referring to?
2. Following the SI units, what are the exact numbers the units K, M, G and T referring to?
3. In a computer, one factor governing the performance is the clock cycle. For a processor its clock speed is 5G Hertz, it means that the processor can perform 5G number of microinstructions in a second. Now, what is the actual number of the 'G' referring to?
4. The data transfer rate of local area network, like NCHU network, is usually 100Mbps. What is the full name of the unit 'bps'? What is the actual number of the 'M' referring to?

5 CPU/GPU

In the old day, one processor consisted of one CPU. Today, multiple CPUs and/or multiple GPUs can be made in a single processor. Each CPU (resp. GPU) is called a core in the processor.

1. What is the full name of CPU?
2. What is the full name of GPU?
3. It is clear that CPU is made of a huge number of logic gates. Is GPU made of logic gates as well?
4. Consider a logic gate as a two-input-one-output electronic circuit. State the common logic gates that are available on the market. As NOT gate is a single-input-single-out logic gate, you can exclude this.
5. Find out roughly how many logic gates in ENIAC.
6. Find out roughly how many logic gates in a typical Intel Core i9 processor.

6 Usage of a Computing Machine

1. Today, a smartphone can let a user to make a voice call and access Internet. Is(Are) CPU(s) embedded in a smartphone?
2. In terms of their usages, state the differences between a notebook computer and a smartphone.
3. What is(are) the usage(s) of computer in an aeroplane?
4. What is(are) the usage(s) of computer in an auto-driving car?
5. What is(are) the usage(s) of computer in a power plant?
6. What is(are) the usage(s) of computer in a firm?
7. What is(are) your usage(s) of computer in a learning?

7 Use of AI Tools

1. Should John Sum accept students using AI tools for their assignments?
2. Should John Sum use an AI tool to grade a student's assignment file?