

Mock Mid-term Exam, 2018 Fall.

Notice: The solutions of all problems of the mid-term will be found in teaching slides. However, only at most 65% of problems of the mid-term come from this mock exam.

Chapter 1

1. What prize represents the highest honor in computer science?
2. What terminology means the process of finding and fixing errors in a computer program?
3. What are the five components that a modern computer has?
4. Which programming language is the first high-level language in the world?
5. Please describe the main changes of electronic components from the first generation computers to the fourth generation computers.

Chapter 2

6. Please convert the binary $(1101.11)_2$ to decimal.
7. Please convert the hexadecimal $(A3F.5B)_{16}$ to decimal.
8. Please convert the decimal 35.8125 to binary.
9. Please convert the octal $(4116)_8$ to hexadecimal.
10. Find the minimum number of bits required to store a positive integer with a maximum of four decimal digits?

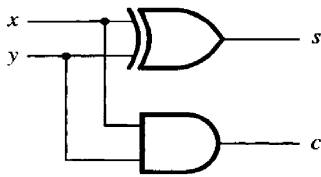
Chapter 3

11. Store the integer -6 in an 8-bit memory location using sign-and-magnitude representation.
12. Retrieve the integer that is stored as 11100101 in sign-and-magnitude representation.
13. Store the integer -27 in an 8-bit memory location using two's complement representation.

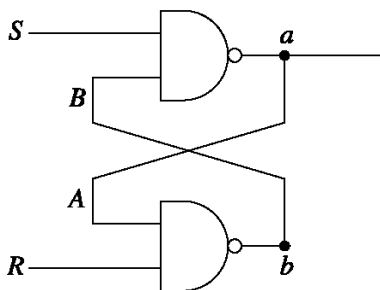
14. Retrieve the integer that is stored as 11100101 in two's complement representation.
15. Show the IEEE Excess_127 representation of the decimal real number 5.75.
16. What three steps are needed to convert analog audio to digital data?

Chapter 4

17. The following graph shows a half-adder. What are the values of s and c when $x = 1$ and $y = 0$?



18. Assume that x and y are respectively equal to 00011000 and 11101111 in two's complement representation. Please answer the value of $x + y$ in two's complement representation.
19. Assume that x and y are respectively equal to 11011101 and 00010100 in two's complement representation. Please answer the value of $x - y$ in two's complement representation.
20. Let 11010001 be the value of x in sign-and-magnitude representation. Show the value of x in two's complement format.
21. Assume that x and y are respectively equal to 11010001 and 01100100 in sign-and-magnitude representation. Please answer the value of $x + y$ in two's complement representation.
22. The following graph shows the S-R latch. Show that S-R latch can store 1-bit data when $S = 1$ and $R = 1$.



Chapter 5

23. What is the memory hierarchy?
24. What three phases that a machine cycle usually consists of?
25. Assume that the time duration of one machine cycle is $3T$. Then how much time that a modern computer needs to execute 9 instructions using pipelining technique? Note that we assume that these 9 instructions are not I/O instructions, and are independent with each other.
26. What are the drawbacks of using programmed I/O (also known as polling) method to deal with I/O instructions?
27. Please briefly describe how DMA (Direct Memory Access) works?