一、判断题（本大题共 5 小题，每小题 2 分，共 10 分）

提示：正确打✓，错误打×，将其结果填写在下表中，并改正。

1. A byte is 8 bits, but a word may vary in size (16-bits, 32-bits, etc.) from one architecture to another.（ ）
2. The term endian refers to the byte ordering, or the way a computer stores the bytes of a multiple-byte data element.（ ）
3. Accumulator architectures use sets of general purpose registers to store operands（ ）
4. A two pass assembler generally creates a symbol table during the first pass and finishes the complete translation from assembly language to machine instructions on the second.（ ）
5. The MAR, MBR, PC and IR registers in MARIE can be used to hold arbitrary data values.（ ）

二、简答题（本大题共 7 小题，每小题 3 分，共 21 分）。

1. Name the three basic components of every computer. （共 3 分）
2. Describe how an interrupt works and name four different types interrupt at least. （共 3 分）
3. What is the difference between synchronous buses and nonsynchronous buses? （共 3 分）
4. Explain the differences between data buses, address buses, and control buses? （共 3 分）
5. What is an address mode? List five types of address mode. （共 3 分）
6. What are the advantages and disadvantages of fixed-length and variable-length instructions? Which is currently more popular? （共 3 分）
7. Explain the concept of pipelining. （共 3 分）

三、填空题（本大题共 10 空，每空 2 分，共 20 分）

1. the main functions of the CPU is _____ sure the speed of a computer clock _____.
2. Virtual memory can be implemented with different techniques, including：_____, _____, _____.

3. List the three fields in a set associative cache address_____,_____,_____.
4. Given a memory of 2048 bytes consisting of several 32 Byte×8 RAM chips, and assuming byte-addressable memory, the correct way is using_____bits for chip select and_____bits for address on chip.

四、问答题（本大题共 6 小题，每小题 5 分，共 30 分）。

1. Write down the characteristics present in a von Neumann architecture. (共 5 分)
2. Name the four types of I/O architectures. Where are each of these typically used and why are they used there? (共 5 分)
3. Explain how fully associative cache is different from direct mapped cache. (共 5 分)
4. What is a TLB and how does it improve EAT? (共 5 分)
5. Convert the following expressions from reverse to infix Polish (postfix) notation. (5 分)
   a) a)X Y × W Z × V U × + +
   b) b)W X ×W U V × Z +× +
   c) c)W X Y U V ×× + × U X Y + × /
6. In a computer instruction format, the instruction length is 16 bits and the size of an address field is 4 bits. Is it possible to have:

   15 3-address instructions

   13 2-address instructions

   47 1-address instructions

   16 0-address instructions

   using the format? Justify your answer. （共 5 分）

五、编程、设计及分析题（本大题共 2 小题，共 19 分）。

1. (共 8 分)
   a. Write the following expression in postfix (Reverse Polish) notation. Remember the rules of precedence for arithmetic operators! (3 分)

$$X = A - B + C \times (D \times E - F)$$

   b. Write a program to evaluate the above arithmetic statement using a stack organized computer with zero-address instructions (so only pop and push can access memory). (5 分)

2. (共 11 分) Suppose a computer using direct mapped cache has 215 words of main memory, and a cache of 8 blocks, where each cache block contains 8 words. If a block is missing from cache, the entire block is brought into the cache and the access is restarted. Initially, the cache is empty.

   a. How many blocks of main memory are there?(2 分)

   b. What is the format of a memory address as seen by the cache, that is, what are the sizes of the tag, block, and word fields? (2 分)

   c. o which cache block will the memory reference 0x39A map? (2 分)

   d. Compute the hit ratio for a program that loops 4 times from locations 2 to 7810 in memory. (5 分)