1. (5 points) Circle the correct answer among the choices given. If you circle more than one answer, you will lose the grade of the corresponding question.

(A) The assembler is:
1. machine dependent  2. language dependent  3. both  4. none

(B) The following number: 0x1F00001 can be interpreted as:
1. signed int  2. unsigned int  3. single precision floating point  4. all of them

(C) The instruction `leal (%eax), %ebx` accesses the memory:
1. once  2. twice  3. 0 times  4. depends on whether 32-bit or 64-bit

(D) Regarding instruction set architecture, backward compatibility means
1. executing old instructions on new hardware
2. executing new instructions on old hardware
3. both 1 and 2
4. none of the above

(E) Which of the following pointers has a larger size (in terms of bytes)?
1. pointer in a 32-bit machine  2. pointer in a 64-bit machine
3. pointer in a 32-bit machine pointing to an array of 100 integers
2. (2 points) assign a value to \( x \) and a value to \( y \) (you can specify them in binary) such that
   a. \((x && y)\) is evaluated to true and \((x \& y)\) is evaluated to false
   b. How about the other way around?

3. [2 points] In C, like in many other languages, we need to declare a variable before we can use it. For instance, we have to declare \( \text{int } x; \) before we can use \( x \). Why is that (state two reasons)?

   •
   •

4. [2 points] Suppose we have the following decimal number: \(-10\)
   a) Write that number in an 8-bit binary number. To get full credit, show all the steps.
   b) Translate the number you calculated in a) above to hexadecimal.
5. [2 points] Suppose x is an integer. We want to test whether the two most significant bits of x are 1 or not (i.e. the two left most bits), so we wrote the C expression:

```c
if( .... )
  { tests successful and the two bits are 1 }
else
  {means at least one bit of the two most significant bits is 1}
```

What will you put between the parenthesizes in order to test that condition?

6. Suppose that we have the following number: 0xAA
   a) [1 point] Write this number in binary:

   b) [2 points] Suppose that this number is interpreted as unsigned number, what is the decimal equivalent (note: you don’t have to write a final decimal number, you can leave it in the format of \(2^x+2^y+\ldots\)). To get full score, show all the steps.

   c) [2 points] Suppose that this number is interpreted as signed number, what is the decimal equivalent (note: you don’t have to write a final decimal number, you can leave it in the format of \(2^x+2^y+\ldots\)). To get full score, show all the steps.
7. [2 points] Suppose “a” is a pointer to unsigned integer
(i.e. it was declared as \textit{unsigned int * a;}) and points to the following array of unsigned integers:
\{1,1,2,2,3\}.
How many times the body of the following loop will be executed? Justify

\textbf{while( (*a++) \& 0x1 ) \{ .... loop body .... \}}