

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Briefly describe the following terms.

- (a) Edge devices. (10%)
- (b) Von Neumann machine. (10%)
- (c) Internet of Things. (10%)
- (d) Cloud computing. (10%)

2. The following program tries to copy words from the address in register \$a0 to the address in the register \$a1 and count the number of words copied in register \$v0. The program stops copying when it finds a word equal to 0. You do not have to preserve the contents of registers \$v1, \$a0, and \$a1. This terminating word should be copied but not counted.

```

Loop:  lw $v1, 0($a0)
      addi $v0, $v0, 1
      sw $v1, 0($a1)
      addi $a0, $a0, 1
      addi $a1, $a1, 1
      bne $v1, $zero, loop
    
```

There are multiple bugs in this MIPS program. Please fix them and turn in bug-free version. (10%)

3. Please explain the following designs.

- (a) What are the difference in architecture design between CPU and GPU? (10%)
- (b) Why does GPU perform better than CPU in executing deep learning applications? (10%)

4. Define zero, de-normalized number, floating point number, infinity, and NaN (Not a Number) in IEEE 754 double precision format by giving the range of their exponents and significands, respectively. Give your answer as the following format. (20%)

	zero	de-normalized	floating point	infinity	NaN
exponent					
significand					

5. Write a C program which exhibits the temporal and spatial localities. The C program cannot exceed 5 lines. (10%)