1. Which categories of people are concerned about performance of computers?

   Answer: The customer, the vendor, and the computer designer

2. When you want to choose a courier delivery service, what performance metrics will you consider?

   Answer: Delivery time, reliability, cost per unit weight, max. weight, online tracking, etc.

3. What metrics is/are of concern for a computer user?

   Answer: The execution time/response time.

4. If MIPS supports the `blt` instruction, the number of instructions is 5 million and the cycle time increases by 20%. But if we don't support it, 10% instructions will have to be `blt`, which needs to be replaced by 2 instructions. Given this data, should `blt` be supported as a MIPS instruction?

   (a) Yes, because it would make the program execute faster
   (b) No, because it would make the program execute slower

   Answer: (b)

5. Two implementations of the same instruction set are as follows:

   - Implementation-1: 2 GHz, CPI = 1.5
   - Implementation-2: 2.4 GHz, CPI = 2

   Which implementation is faster and by how much?

   (a) Implementation-1 is faster by a factor of 1.6
   (b) Implementation-2 is faster by a factor of 1.6
   (c) Implementation-1 is faster by a factor of $\frac{10}{9}$
   (d) Implementation-2 is faster by a factor of $\frac{10}{9}$

   Answer: (d)

6. The Intel instruction set supports memory as an operand in `add`:

   - Option-1: implement add as 3 cycles
   - Option-2: additional hardware support

- Implication-1: number of cycles increases from 2 million to 2.4 million
- Implication-2: cycle length increases by 10

Which option is better?

(a) Option-1 of longer `add`

(b) Option-2 of longer clock time

Answer: (b)

7. Which of the three components of the computer performance equation does the algorithm affect? Select all that apply.

   (a) number of instructions

   (b) CPI

   (c) cycle time

   Answer: (a), sometimes (b)

8. Which of the three components of the computer performance equation does the choice of HLL affect? Select all that apply.

   (a) number of instructions

   (b) CPI

   (c) cycle time

   Answer: (a), (b)

9. Which of the three components of the computer performance equation does the compiler affect? Select all that apply.

   (a) number of instructions

   (b) CPI

   (c) cycle time

   Answer: (a), (b)

10. Which of the three components of the computer performance equation does the ISA affect? Select all that apply.

    (a) number of instructions

(b) CPI
(c) cycle time

Answer: (a), (b), (c)

11. Which of the three components of the computer performance equation does the hardware implementation of the ISA affect? Select all that apply.

(a) number of instructions
(b) CPI
(c) cycle time

Answer: (b), (c)

12. We are given the following data and code sequences:

- CPI for branch instructions: 2
- CPI for `lw`/`sw`: 3
- CPI for reg-reg: 1

- Code-sequence-1: 8 branches, 8 loads, 2 stores, 8 reg-reg
- Code-sequence-2: 2 branches, 14 loads, 2 stores, 8 reg-reg

Which code sequence is better? By what factor?

(a) The first sequence, by a factor of 10/9
(b) The second sequence, by a factor of 10/9
(c) The first sequence, by a factor of 1.15
(d) The second sequence, by a factor of 1.15

Answer: (a)

13. Let us say that Intel wants to improve its CPU chip

- Option-1: memory speedup 10x
- Option-2: ALU speedup 2x

You are also given that $F_{alu} = 0.5, F_{mem} = 0.2, F_{other} = 0.3$. Which of the two options given has better speedup for the program?

(a) Memory improvement
(b) ALU improvement

Answer: (b)