This homework relates to the following program. The label `start` is located at address 0x00400038.

```
start:    lw $t0, 0($a1)
          lw $t1, 0($a0)
          add $t2, $a0, $zero
          add $t3, $t0, $zero
          addi $t7, $zero, 1
          j C
A:        lw $t4, 0($t2)
          slt $v0, $t4, $t1
          beq $v0, $zero, B
          add $t1, $t4, $zero
          addi $t3, $t3, -1
          addi $t2, $t2, 4
B:        addi $t3, $t3, -1
          addi $t2, $t2, 4
C:        slt $v0, $zero, $t3
          beq $v0, $t7, A
          sw $t1, 0($a2)
          j E
D:        lw $v0, 0($a0)
          sub $v0, $v0, $t1
          sw $v0, 0($a0)
          addi $t0, $t0, -1
          addi $a0, $a0, 4
E:        slt $v0, $zero, $t0
          beq $v0, $t7, D
```

When this code is run:

- memory is initialized to 0, except the program itself and the following values:
  - 0x10010000  00 00 00 1E
  - 0x10010004  00 00 00 0A
  - 0x10010008  00 00 00 07
  - 0x1001000C  00 00 00 c8
  - 0x10010010  00 00 00 04
  - 0x10010014 DE AD B1 FF

- registers are initialized to 0, except the following:
  - $a0 has the value 0x10010000
  - $a1 has the value 0x10010010
  - $a2 has the value 0x10010014

1. what does this code do?
2. after completion, what are the values in the memory range 0x10010000-0x10010017?
3. How many cycles does this code take to run on the single-cycle machine?
4. How many cycles does it take to run on the multi-cycle machine?
5. What is the instruction type (R, I or J) and addressing modes(s) for instructions between `start` and `B` (inclusive)?
6. What is the binary representation for the instructions between `B` and `D` (inclusive)?