Question 1:

```
addi    $t0, $s6, 4
add     $t1, $s6, $0
sw      $t1, 0($t0)
lw      $t0, 0($t0)
add     $s0, $t1, $t0
```

For each of the above MIPS instruction, show the value of the opcode (OP), source register (RS), and target register (RT) fields. For the I-type instructions, show the value of the immediate field, and for the R-type instructions, show the value of the destination register (RD) field.

Question 2:

a) Provide the type and assembly language instruction for the following binary value:

$0000\ 0010\ 0001\ 0000\ 1000\ 0000\ 0010\ 0000_{two}$

b) Provide the type, assembly language instruction, and binary representation of instruction described by the following MIPS fields: op=0, rs=3, rt=2, rd=3, shamt=0, funct=34

c) Provide the type, assembly language instruction, and binary representation of instruction described by the following MIPS fields: op=0x23, rs=1, rt=2, const=0x4

Question 3:

In addition to the basic laws we discussed in section B.2, there are two important theorems, called DeMorgan's theorems:

$$\overline{A + B} = \bar{A}.\bar{B} \ \ and \ \overline{A.B} = \bar{A} + \bar{B}$$

Prove DeMorgan's theorems with a truth table.

Question 4:

Draw the logic for the Sum bit in the adder, i.e.,

$$Sum = \left(a.\bar{b}.\overline{CarryIn}\right) + \left(\bar{a}.b.\overline{CarryIn}\right) + \left(\bar{a}.\bar{b}.CarryIn\right) + \left(a.b.CarryIn\right)$$