

Question 1

- a. The size of the instruction is 9 bits for the opcode + 25 bits for the memory address = 34 bits.
- b. The number of different instructions that the computer can have been $2^{34} = 4.32 \times 10^9$.
- c. The maximum memory size that the computer can address is $2^{25} = 32\text{M}$ bytes, or about 33.5M bytes.

Question 2

- a. The opcode field can be 8 bits long since there are 8 registers.
- b. The CPU can support 256 instructions since there are $2^8 = 256$ possible values for the opcode field.

Question 1a

The size of the instruction is the sum of the size of the opcode field and the size of the memory address field. The opcode field is 9 bits long, and the memory address field is 25 bits long. Therefore, the size of the instruction is 9 bits + 25 bits = 34 bits.

Question 1b

The number of different instructions that the computer can have been 2^{34} , since there is 2^{34} possible values for the 34-bit instruction.

Question 1c

The maximum memory size that the computer can address is 2^{25} bytes since the memory address field is 25 bits long. This is equivalent to about 32M bytes, or 33.5M bytes.

Question 2a

The opcode field can be 8 bits long since there are 8 registers. The registers are used to store the operands of the instruction, so the opcode field must be at least 8 bits long to accommodate the 8 registers.

Question 2b

The CPU can support 256 instructions since there are $2^8 = 256$ possible values for the opcode field. Each value of the opcode field corresponds to a different instruction.