

Quiz 2

رقم الشعبة: 1

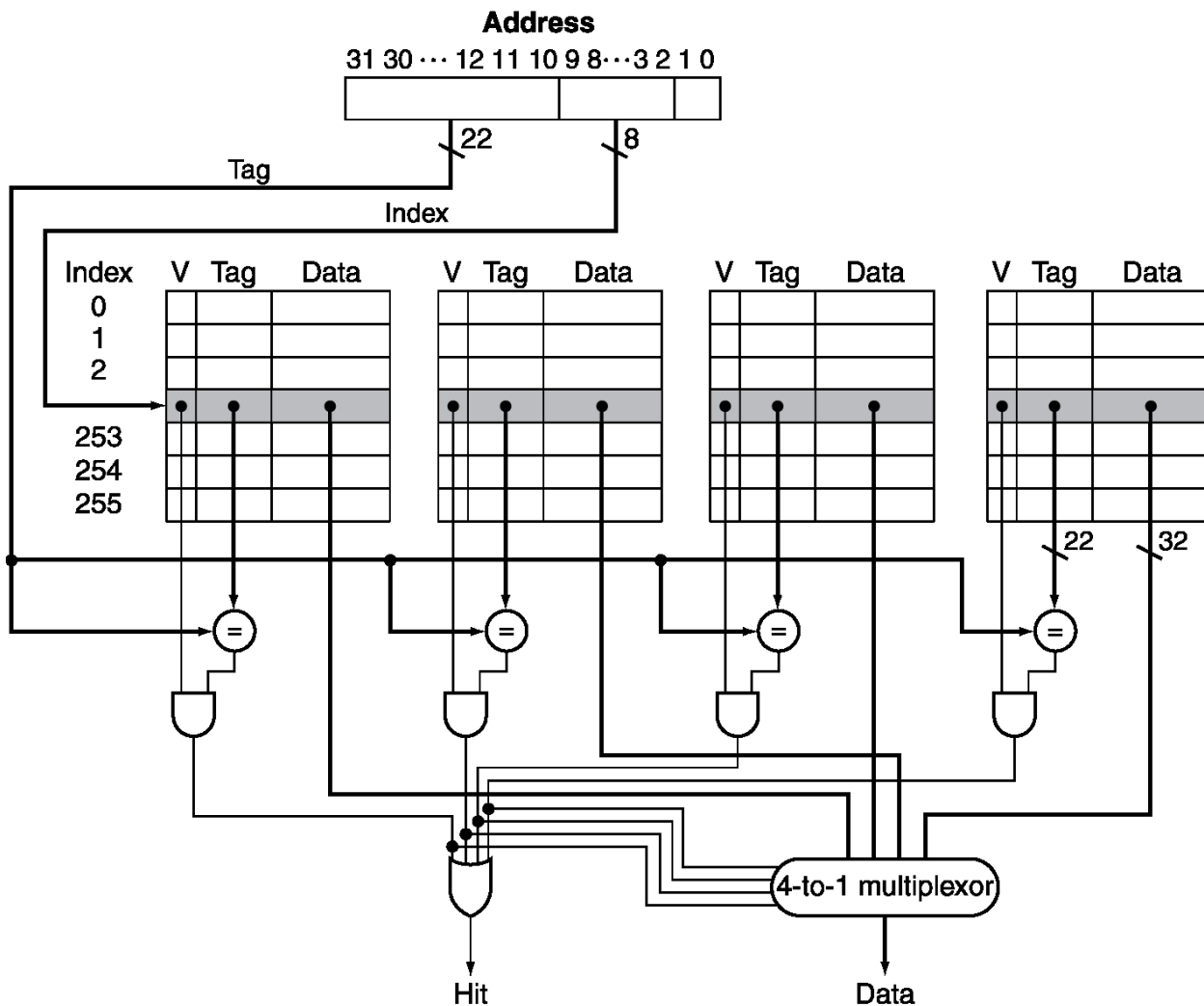
الرقم التسلسلي:

الاسم:

**Instructions:** Time **15** minutes. Open book and notes exam. No electronics. Please answer all problems in the space provided and limit your answer to the space provided. **No questions are allowed.**

<Good Luck>

**Q1.** Consider the following cache.



**Expand the block offset from 2 to  $\lg_2 (128/8) = 4$  bits**

**Shorten the tag from 22 to 20 bits**

**Add another 4-to-1 multiplexor at the data output controlled by Address Bits 2 and 3**

A) How many sets does this cache have?

[1 marks]

**256 sets**

B) How many blocks does this cache have?

[1 marks]

**4×256 = 1024 blocks**

C) Modify the above diagram such that the block size becomes 128 bits instead of 32 bits.

[3 marks]

**Q2.** Rewrite the following loop to improve its data locality.

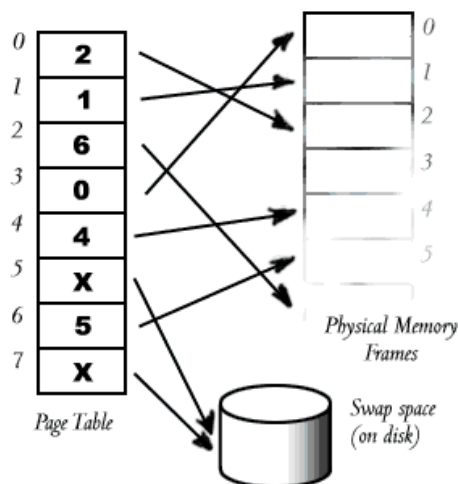
[2 marks]

```
for (i=0; i<10000; i++) {
    for (j=0; j<10000; j++)
        A[i][j] = A[i][j] * s;
    for (j=0; j<10000; j++)
        B[i][j] = B[i][j] + A[i][j];
}
```

```
for (i=0; i<10000; i++) {
    for (j=0; j<10000; j++) {
        A[i][j] = A[i][j] * s;
        B[i][j] = B[i][j] + A[i][j];
    }
}
```

**Q3.** Given the following page table and assuming that the page size is 4 KB,

[3 marks]



A) Does the virtual address  $00003ABC_{16}$  generate a page fault?     **No**    

B) What is the physical address of the virtual address  $00003ABC_{16}$ ?     **00000ABC**<sub>16</sub>