

CS 60B Midterm #3 — November 9, 1992

Your name _____

login c60b-_____

Discussion section number _____

TA's name _____

This exam is worth 12 points, or 12% of your total course grade. The exam contains seven substantive questions, plus the following:

Question 0 (1 point): Fill out this front page correctly and put your name and login correctly at the top of each of the following pages.

This booklet contains four numbered pages including the cover page. Put all answers on these pages, please; don't hand in stray pieces of paper. This is an open book exam.

When writing procedures, write straightforward code. Do not try to make your program slightly more efficient at the cost of making it impossible to read and understand.

When writing procedures, don't put in error checks. Assume that you will be given arguments of the correct type.

Our expectation is that many of you will not complete one or two of these questions. If you find one question especially difficult, leave it for later; start with the ones you find easier.

0	/1
1	/1
2	/1
3	/1
4	/1
5	/1
6	/2
7	/4
total	/12

Questions 1–6 concern a C procedure that begins like this:

```
struct pair {int coords[2];};

char *foo(int nums[7], struct pair xy) {
    char *p = "computer";          /* assume this ends up at 20($29) */
    char a[10];                    /* assume this ends up at 4($29)  */
    register char ch;              /* assume this ends up in $16   */

    <...some instructions (see questions below)...>
}
```

Question 1 (1 point):

Within this procedure, what is the value of `sizeof(p)`?

Question 2 (1 point):

Within this procedure, what is the value of `sizeof(nums)`?

Question 3 (1 point):

Within this procedure, what is the value of `sizeof(xy)`?

Question 4 (1 point):

Which of the following might be a translation into MIPS assembly language of the C instruction `p=a;`?

- (a) `lb $8, 4($29)`
 `sw $8, 20($29)`
- (b) `lw $8, 4($29)`
 `sw $8, 20($29)`
- (c) `addi $8, $29, 4`
 `sw $8, 20($29)`
- (d) None—it's an illegal instruction

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These questions still refer to the procedure on page 2!

Question 5 (1 point):

Which of the following might be a translation into MIPS assembly language of the C instruction `a=p;`?

- (a) `lb $8, 4($29)`
 `sw $8, 20($29)`
- (b) `lw $8, 4($29)`
 `sw $8, 20($29)`
- (c) `addi $8, $29, 4`
 `sw $8, 20($29)`
- (d) None—it's an illegal instruction

Question 6 (2 points):

All three of the following are possible translations of C instructions into MIPS assembly language. One of them is a possible translation of the C instruction `ch=*p++;` and the others are possible translations of similar but different C instructions. Next to each of these three, indicate the corresponding C instruction.

- (a) `lw $8, 20($29)`
 `addi $8, $8, 1`
 `lb $16, 0($8)`
 `sw $8, 20($29)`
- (b) `lw $8, 20($29)`
 `lb $16, 0($8)`
 `addi $8, $8, 1`
 `sw $8, 20($29)`
- (c) `lw $8, 20($29)`
 `lb $16, 0($8)`
 `addi $16, $16, 1`

Question 7 (4 points):

Using the following structure declaration:

```
struct node { int value;  
              struct node *next; };
```

write a C function `ArrayToList` that takes two arguments, an array of integers and an integer specifying the length of the array, and returns a list whose elements are equal to the array elements, in the same order. Your function should begin like this:

```
struct node *ArrayToList(int array[], int length) {
```