

**Programming Languages**  
**Homework 5**  
**Due Wednesday, February 12th at 2 AM**

**Download this homework assignment**, and fill in your answers, then convert this document into pdf as a report to GradeScope. We are scanning this report so please **do not change the first-page layout**. For question 1, put the answers for the sizes in the indicated areas below; For question 2, paste your code for each of the lisp functions.

1. Consider the following C++ declarations and assume **int** is 4 bytes, **double** is 8 bytes, and **char** is 1 byte:

```
struct Bar {
    double f;
    int i;
    char c,d,e,g;
};
union Foo {
    double f;
    char c;
    Bar b;
};

Foo a[10];
Bar b;
Foo f;
```

- a. **[10]** Give the size (in bytes and in decimal) of each of the following variables:

- o **Bar::c = 1 byte** // This is an example
- o b = 16 bytes
- o f = 16 bytes
- o a = 160 bytes

- b. **[10]** Give the address (in decimal) of each of the following assuming the address of a is 1000:

- o  $a[5].b.g = 1000 + 5 * 16 + 1 = 1081$
- o  $a[4].b.i = 1000 + 4 * 16 + 4 = 1068$
- o  $a[6].f = 1000 + 6 * 16 = 1096$