CMPU-224 Lab5 Practice
Spring 2025

1. Consider the following structure declaration:

```
struct question {
    short  a;
    int    b;
    char   c;
    double d;
};
```

   (a) Give the total size of the structure in bytes (i.e., the value of the `sizeof(struct question)` expression).

   `sizeof(struct question)` returns _____

   (b) If the structure declaration above was rearranged to minimize the space of the structure, what would be the new size of the structure?

   Total size of rearranged and minimized `struct` in bytes: _____

   (c) Assume you have the following C code utilizing the above (unminimized) structure:

```
long prob(struct question *x) {
    return x->b;
}
```

   Fill in the missing blanks below for the assembly language implementation of the above function.

```
prob:




    ret
```

2. You have the following two-dimensional array declared as follows:

```
int matrix[7][4];
```

   Assume the start of the array is at address `0x4000`.

   What are the indices (`x` and `y` below) of the array that refers to the array element at address `0x4058`?

3. Consider the following C function that accesses an array of 32-bit integers and checks a condition:

```
int check_threshold(int arr[], int index) {
    if (arr[index] >= 50) {
        return 1;
    }
    return 0;
}
```

Below is the corresponding assembly code. Fill in the missing RV32 assembly instructions to make the code function correctly.

```
check_threshold:

  slli_____________________________________

  add t0, a0, t0

  lw t1,_____________________________________

  li t2, 50

  blt_____________________________________

  li a0, 1

  ret

.END:

  li a0, 0

  ret
```