Below is the example C-> ASM -> Machine code we looked at last class
Beside it is this program written in the input format accepted by our Simple Machine simulator

C

```
int a;        // an int
int b[10]; // array of 10 ints

void foo () {
  a    = 2;
  b[a] = a;
}
```

ASM

```
ld $2, r0
ld $0x1000, r1
st r0, (r1)

ld (r1), r2
ld $0x2000,  r3
st r2,  (r3,r2,4)
```

Machine Code

```
00-- 0x2
01-- 0x1000
3001

1012
03-- 0x2000
4232
```

Simple Machine .s file

```
.pos 0x100
        ld   $2,   r0          # r0 = 2
        ld   $a,   r1          # r1 = address of a
        st   r0,  (r1)         # a = value in r0 (2)
        ld   (r1), r2          # r2 = value at address of a
        ld   $b, r3            # r3 = address of b
        st   r2, (r3, r2, 4) # b[a] = a
        halt                   # halt
.pos 0x1000
a:      .long 0x4              # a = 4
.pos 0x2000
b:      .long 0xffffffff       # b[0] = -1
        .long 0xffffffff       # b[1] = -1
        .long 0xffffffff       # b[2] = -1
        .long 0xffffffff       # b[3] = -1
        .long 0xffffffff       # b[4] = -1
        .long 0xffffffff       # b[5] = -1
        .long 0xffffffff       # b[6] = -1
        .long 0xffffffff       # b[7] = -1
        .long 0xffffffff       # b[8] = -1
        .long 0xffffffff       # b[9] = -1
```

Exercise: Write the .s file that corresponds to the following C code that uses dynamic allocation.
For practice, translate the ASM to Machine code.
Check your work by stepping through the program in the simulator.

C

```
int a;    // an int
int* b; // a pointer to an int

void foo () {
  b = malloc(10*sizeof(int))
  a    = 2;
  b[a] = a;
}
```

Simple Machine .s file

```
.pos 0x100


.pos 0x1000
a:      .long 0x4           # a = 4
b:


.pos 0x2000
bvals:  .long 0xffffffff     # b[0] = -1
        .long 0xffffffff     # b[1] = -1
        .long 0xffffffff     # b[2] = -1
        .long 0xffffffff     # b[3] = -1
        .long 0xffffffff     # b[4] = -1
        .long 0xffffffff     # b[5] = -1
        .long 0xffffffff     # b[6] = -1
        .long 0xffffffff     # b[7] = -1
        .long 0xffffffff     # b[8] = -1
        .long 0xffffffff     # b[9] = -1
```

Machine Code