Assignment #2
Due at the beginning of class, Tuesday February 28

Please print this document single-sided to give yourself more space to write
Answer directly on the printout.

1. Translate the following C code snippet to IA32 assembly. Start by rewriting the C code to replace the while loop with goto statements.

```c
int apple, orange, banana;
apple = -5;
orange = 11;
banana = apple >> 1;
while (orange >= banana) {
    banana = banana * 5;
    if ((apple & 1) == 0) {
        apple = banana + orange;
    }
}
```

You may assume that the variables are stored at the following memory locations:

- apple: $RAM[\%ebp - 12]$
- orange: $RAM[\%ebp - 8]$
- banana: $RAM[\%ebp - 4]$
2. Translate the following IA32 assembly snippet into C code. Start by translating to C code with goto, then rewrite it to eliminate the goto statements.

```assembly
movl $5, -12(%ebp)  
movl $-3, -8(%ebp)   
movl -8(%ebp), %eax
subl -12(%ebp), %eax
subl -12(%ebp), %eax
movl %eax, -4(%ebp)
cmpl $0, -4(%ebp)    
jle .L2
movl $1, %eax
subl -8(%ebp), %eax
movl %eax, -4(%ebp)
jmp .L4
.L2:
cmpl $0, -4(%ebp)    
jns .L4
subl $2, -12(%ebp)  
.L4:
# end
```

The C program has variables x, y, and z, stored at the following memory locations:

- x: RAM[ebp - 12]
- y: RAM[ebp - 8]
- x: RAM[ebp - 4]