## Part II: Python Code to Assembly Language

2. Convert the following Python code into assembly language code. Start your code at memory cell 0 and assume that variables a, b, c, & d are stored in memory cells 101, 102, 103, & 104.

```
d = a + b - c
if a > b:
  c = a
```

```
0 load A
1 add B
2 subtract C
3 store D
4 load B
5 compare A
6 jumpgt 9
7 jumpeq 11
8 jumplt 11
9 load A
10 store C
11 halt
```

3. Convert the following Python code into assembly language code. Start your code at memory cell 0 and assume that variables a, b, c, & d are stored in memory cells 101, 102, 103, & 104 *(Hint: Your answer from the question above may be a good start.)*

```
d = a + b - c
if a > b:
  c = a
if a == b:
  a = b - c
```

```
0 load A
1 add B
2 subtract C
3 store D
4 load B
5 compare A
6 jumpgt 9
7 jumpeq 12
8 jumplt 15
9 load A
10 store C
11 jump 15
12 load B
13 subtract C
14 store A
15 halt
```

4. Convert the following Python code into assembly language code. Start your code at memory cell 0 and assume that variables a, b, c, & d are stored in memory cells 101, 102, 103, & 104 *(Hint: Your answer from the question above may be a good start.)*

```
d = a + b - c
if a > b:
  c = a
elif a == b:
  a = b - c
else:
  a = a - 1
```

```
0 load A
1 add B
2 subtract C
3 store D
4 load B
5 compare A
6 jumpgt 9
7 jumpeq 12
8 jumplt 16
9 load A
10 store C
11 jump 17
12 load B
13 subtract C
14 store A
15 jump 17
16 decrement A
17 halt
```

## Part III: Assembly Language to Python Code

5. Convert the following assembly language code into Python code; assume that variables A, B, and C are stored in memory cells 101, 102, and 103, respectively.

| Address | Instruction |
|---|---|
| 1 | LOAD C |
| 2 | SUBTRACT A |
| 3 | ADD B |
| 4 | ADD B |
| 5 | STORE C |
| 6 | INCREMENT A |
| 7 | HALT |

```
C = C - A + B + B
A = A + 1
```

6. Convert the following assembly language code into Python code. In your answer, the variables stored at locations 101, 102, & 103 should be named a, b, & c.

| Registers | | Memory Address | Instruction or Data |
|---|---|---|---|
| PC | | #1 | LOAD ~~102~~ B |
| R | | #2 | COMPARE ~~101~~ A |
| IR | | #3 | JUMPLT 9 |
| CCR | | #4 | JUMPEQ 9 |
| | | #5 | LOAD ~~103~~ C |
| | | #6 | SUBSTRACT ~~101~~ A |
| | | #7 | STORE ~~103~~ C |
| | | #8 | JUMP 11 |
| | | #9 | LOAD ~~101~~ A |
| | | #10 | STORE ~~102~~ B |
| | | #11 | DECREMENT ~~101~~ A |
| | | #12 | HALT |
| | | . | |
| | | . | |
| | | #100 | |
| | | #101 | |
| | | #102 | |
| | | #103 | |

```
if A>B:
    C=C-A
else:
    B=A
A=A-1
```