1. Show the correctness of the following `max()` (30 pts)

```
/* max() should return a bigger value between a and b if a!=b.
    If a==b, max() should return the value of b*/
int max(int a, int b) {
    int bigger=0;
    if( a >= b +1) bigger = a;
        else bigger= b;
    return bigger;
}
```

2.1 Write down a proper `assert` statement to check the correctness of `max()`

2.2 Transform `max()` into a SSA form and write down the SSA form.

2.3 Write down a corresponding QF_LIA specification and check the correctness by using a Z3 SMT solver. Also, provide the Z3 result.

(note. you should show validity, not satisfiability for software verification)

2.4 Write down a corresponding QF_BV and check the correctness by using a Z3 SMT solver. Also, provide the Z3 result.

2.5 Compare the result of 2.3 and 2.4. Why are the results different?

2. Transform the following sort program into QF_AUFLIA specification and write down that QF_AUFLIA specification. Also, check and report the correctness by using a Z3 SMT solver (20 pts).

```
#define N 3
int main(){
    // local variables are initialized with random values
    int data[N], i, j, tmp;

    for (i=0; i<N-1; i++)
       for (j=i+1; j<N; j++)
            if (data[i] > data[j]){
                tmp = data[i];
                data[i] = data[j];
                data[j] = tmp;
            }
   assert(data[0] <= data[1] && data[1] <= data[2]);
}
```