COMP 122/L
Summer 2023

Binary Arithmetic (Answers)

1.) Consider addition over a single bit. For each question, specify both the result of the addition, as well as the output carry bit value.

1.a.) 1 + 1, input carry bit unset.

effectively 1 + 1 + 0; 0, carry set

1.b.) 1 + 1, input carry bit set.

effectively 1 + 1 + 1; 1, carry set

1.c.) 1 + 0, input carry bit set.

effectively 1 + 0 + 1; 0, carry set

1.d.) 1 + 0, input carry bit unset.

effectively 1 + 0 + 0; 1, carry unset

2.) For each question, your output should be a 4-bit binary number. Additionally, say what the values of the output carry bit and output overflow bit are.

2.a)
```
    1
   1001
 + 1001
   0000; carry, overflow since leftmost
inputs are same, but output leftmost isn't
```

2.b)
```
  1 1 1
   0111
 + 0001
   1000; no carry, overflow
```

2.c)

```
  1001
- 1001

  1111
 11001
+ 0110
  0000; carry, no overflow
```

2.b)

```
  1111
- 0001

 11111
  1111
+ 1110
  1110; carry, no overflow
```