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ASSIGNMENT 2

Binary addition and subtraction; converting Boolean expression into logic gates and vice-versa.

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(I) EXERCISE → Binary addition and Subtraction.

→ Binary addition -

1) 10001 + 11101

```
  1       1
  1 0 0 0 1
+ 1 1 1 0 1
-----------
1 0 1 1 1 0
```

2) 011011 + 100101

```
  1 1 1 1 1 1
  0 1 1 0 1 1
+ 1 0 0 1 0 1
-------------
1 0 0 0 0 0 0
```

3) 00101 + 01100

```
    1 1
  0 0 1 0 1
+ 0 1 1 0 0
-----------
  1 0 0 0 1
```

4) 10110 + 10101

```
  1     1
  1 0 1 1 0
+ 1 0 1 0 1
-----------
1 0 1 0 1 1
```

5) 101010 + 110100

```
1
  1 0 1 0 1 0
+ 1 1 0 1 0 0
-------------
1 0 1 1 1 1 0
```

→ Binary Subtraction -

1) 10101 - 01101

```
    2
  X 0 1 0 1
- 0 1 1 0 1
-----------
  0 1 0 0 0
```

2) 10011 - 101101

2's complement of (101101) = (010010) + 1

```
  1 0 0 1 1
+ 0 1 0 0 1 1
-------------
  1 0 0 1 1 0
```

Ans = (2's complement of (100110)) = - 011010

3) 10111 - 01000

```
    0 2
  1 0 1 1 1
  0 1 0 0 0
- ---------
  0 1 1 1 1
```

4) 11010 - 01101

```
    2 0 2
  0 1 1 0 1 0
- 0 1 1 0 1
-----------
  0 1 1 0 1
```

5) 011011 - 100101

M = 011011
N = 100101

2's complement of N = (011010)+1

```
    1   1
  0 1 1 0 1 1
+ 0 1 1 0 1 1
-------------
  1 1 0 1 1 0
```

Ans = -(2's complement of 110110) = -001010

(II) EXERCISE - Convert boolean expressions to logic gates.

↳ Attached logisim file.

(III) EXERCISE - Find boolean expressions from given logic gates.

↳ Attached logisim file.