

Homework 2

1. Group / field theory

Take the set of bits $B = \{0, 1\}$ and the operation \oplus with the following rules:

```
`0 ⊕ 0 = 0`  
`0 ⊕ 1 = 1`  
`1 ⊕ 0 = 1`  
`1 ⊕ 1 = 0`
```

Does the set B and the operation \oplus satisfy the group properties ?

2. Modular arithmetic - you just need to find examples, you don't need to prove anything.

1. Is it true that all odd squares are $\equiv 1 \pmod{8}$?
2. what about even squares $\pmod{8}$?

3. Try out the vanity bitcoin address example at [asecurity](#) or the Ethereum [version](#)

4. What do you understand by

1. $O(n)$
2. $O(1)$
3. $O(\log n)$

5. Which of those is best when describing a proof size