

CS1951L HW1: Bitcoin & Lightning

The Bitcoin Whitepaper

A great introduction to the world of blockchain is the Bitcoin whitepaper, which gave birth to the first cryptocurrency. Please read the paper and respond to the following questions:

1. Double Spending (1 pt.)

Please explain how Bitcoin addressed double spending.

2. Proof of Work (Mining) (1 pt.)

In your own words please explain how Bitcoin deters denial of service attacks or other service abusers.

3. Incentives (1 pt.)

How does Bitcoin incentivize nodes to mine on the network? What are some other effects of these incentives (positive, negative, neutral)?

4. Competing Chains (1 pt.)

If there are two blockchains with divergent histories, which blockchain does Bitcoin protocol tell miners to mine on?

The Lightning Network

A big portion of further understanding cryptocurrency is learning about Bitcoin's Lightning Network. Please read about the Lightning Network and respond to the following questions:

5. Scalability issues (2 pts.)

a. What causes limitations in Bitcoin's scaling? (1)

b. What are two solutions that have been developed to solve the scaling issues, and how do they solve it (forks, off-chain protocols, efficient data structures)? (0.5 for each)

6. Lightning Protocol (1 pt.)

Describe briefly what Lightning Protocol does. (1)

7. Advantages/Disadvantages (2 pts.)

What are some other advantages of the Lightning network? (1)

Can you think of some disadvantages? (1)