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Class: Afternoon

Assignment

Bitcoin was introduced by Satoshi Nakamoto as a peer-to-peer electronic cash system to solve a key problem in digital commerce, the dependence on trusted intermediaries such as banks and payment processors. In traditional online transactions, intermediaries are needed to verify payments, prevent fraud, and settle disputes. While effective, this creates inefficiencies higher transaction costs, slower processing, and greater vulnerability to fraud, chargebacks, and data misuse. Most critically, it fails to prevent *double spending*, the risk that a digital token could be duplicated and used more than once. Bitcoin addresses this challenge by replacing institutional trust with cryptographic proof.

The solution lies in blockchain technology, which serves as Bitcoin's underlying infrastructure. A blockchain is a decentralized public ledger that records all transactions in chained "blocks." Each block is secured through cryptographic hashing and validated by a network of independent computers (nodes). Transactions are confirmed via proof of work, where nodes compete to solve complex puzzles, ensuring fairness and resistance to tampering. Once validated, a block is permanently added to the chain, creating a transparent and immutable history. Because altering any block would require redoing the work of all subsequent blocks, the system is considered tamper resistant. Economic incentives also play a role: miners are rewarded with new bitcoins and transaction fees, encouraging honest participation without relying on a central authority. Privacy is protected by using pseudonymous public keys instead of real identities.

Blockchain matters because its impact goes far beyond cryptocurrency. By enabling secure, irreversible, and direct peer-to-peer transactions, it lowers costs, speeds up settlement, and increases financial autonomy. In finance, it supports cross border payments without intermediaries. In *supply chains*, it ensures real-time traceability and authenticity of goods. In markets, it removes reliance on central platforms, allowing direct interaction among participants. In social system*s*, it powers innovations like e-voting, digital health records, and smart contracts, reducing information asymmetry and automating trust. Ultimately, blockchain is more than a financial tool it is a foundational technology for reshaping digital trust, efficiency, and global economic organization.