Challenge 2: Blockchain Project

Project Description:

This project introduces students to Merkle Trees, a fundamental data structure used in blockchain systems to ensure the integrity and immutability of transaction data. In modern blockchains, transactions within a block are hashed using a cryptographic hash function (in this case, SHA-256) and recursively combined to produce a single hash known as the Merkle Root. This Merkle Root serves as a compact and secure representation of all transactions in the block and enables efficient verification that transaction data has not been altered.

The challenge is to **compute the Merkle Root for the block below** (which contains 7 transactions).

Target Block:

Block Index: 1

Miner Name: MinerX

Previous Block Hash:
0000089ac61913788b22a3c200e5b68c62ec74b678c515d3962fda09c816689c

Merkle Root: ?

Transactions:

[“John pays Charlie 5 BTC”,

“Bob pays Dave 2 BTC”,

“Alice pays Erin 1 BTC”,

“Charlie pays Frank 3 BTC”,

“Dave pays Gina 1 BTC”,

“Erin pays Alice 0.5 BTC”,

“Frank pays Bob 0.25 BTC”]

Solution includes the **Merkle Root** for the Target Block

Submit solution to jose.poveda@utrgv.edu and jorge.a.castillo01@utrgv.edu