Assignment D

1. How many total Bitcoin transactions since 2009?
    a. More than 900 millions; Less than 1 billion
2. Which is NOT the reason why the Btifinex hacker finally got arrested?
    a. Wrong answers : KYC with Bitfinex exchange
    b. Founding AI security company Endpass in Sillcon Vally; Rasing fund from Y Combinator
3. Why is US Government holding more than 300,000 BTC?
    a. Arrest Bitcoin Hacker and seize their Bitcoins: Still need legal process to decide on ownership
4. What is a Coinbase transaction in the context of Bitcoin?
    a. The first transaction in a new block that awards miners their block reward
5. Which statement best describes a Payback transaction in Bitcoin?
    a. It is a transaction used to return funds to a previous owner
6. Which of the following is NOT a characteristic of a Coinbase transaction?
    a. It can only be created by a cryptocurrency exchange
7. Which is NOT Supervised machine learning?
    a. Node2Vec
8. What is supervised machine learning?
    a. A type of machine learning where the model is trained on a labeled dataset
9. Which of the following tasks is typically solved using supervised learning?
    a. Predicting future stock prices based on historical data
10. FinTech consists of many complex optimization problems. Which of the following is a common application of Quantum Inspired Algorithms aimed at accelerating computation?
    a. Speeding up the solution of complex optimization problems

Assignment E

1. [Warm-up questions] Which below is NOT among the 5 asset classes Prof. Liao mentioned before the class? Hint: Choose the least popular answer.
    a. Wrong answers : Crypto
    b. REIT (In Taiwan, monopolized by only big ones)
2. [本課不能做投資建議. 我們正本清源, 著重big data and insight (瞭解頂層架構)] If a project distributes too many chips to retail investors via airdrops, which below is more likely to occur? Note: Chips 意即籌碼.
    a. Token price drops as the number of retail investors who obtains tokens at low cost is too large, resulting in excessive selling pressure
3. [Warm-up questions: 最近電價將漲…] If the price of Bitcoin falls below the mining cost, what decision are miners most likely to make?
    a. Shut down mining machine and sell Bitcoin

4. [Warm-up questions] Prof. Liao showed these 2 figures (in Taiwan dollars) for the returns in 2021 and 2023, before the Labor Day's class. Which is NOT one of his mentioned reasons why 2023 is a worse year than 2021? Note: 財不露白. Don't assume the return is his.
    a. More institution investors in the market squeezed his profit in 2023.
5. [Zero-knowledge proof] We mentioned all of below in 5/8's lecture. Which below helps convert interactive proofs to non-interactive ones?
    a. Fiat-Shamir transfornation
6. [Zero-knowledge proof] We discussed zksnark at the end of 5/8's lecture. Which below is NOT viewed as the 2 correct properties of zksnark? Note: "Simple" is not a property.
    a. necessity
7. [Zero-knowledge proof] Regarding the 2 main use cases for zk in blockchain, one is privacy. What's the other?
    a. Scaling
8. [Zero-knowledge proof] Regarding the 2 main ways to do rollup in blockchain, zk proof is one way. What's the other?
    a. fraud proof
9. [Risk management] Which option carries the highest risk?
    a. Go short on BTC with 50x leverage.
10. [Risk management] In risk management, the following theory can serve as a starting point:
    a. Information theory
11. [Risk management] What is the principle behind the "Let's split it equally" approach?
    a. Maximum Entropy Principle
12. [Risk management] What is the unit in the Kullback–Leibler divergence formula?
    a. bit
13. [Risk management] What kind of technical analysis is based on Maximum Entropy Principle?
    a. SMA
14. [Risk management] What is the first step of risk management?
    a. Know your risk
15. [Risk management] What is the nature of VIX index?
    a. Indexed Implied Volatility
16. [Risk management] What is the main reason for the divergence between the VIX index and the net value of the VIX ETFs?
    a. Basis cost

Participation

1. [Warm-up] AI can be used for FinTech and can be used for RegTech as well. Which is wrong below?
    a. RegTech job in Taiwan is paid very high. E.g., the annual salary of FSC's chair is US$2m instead of NT$2m.

2. [Warm-up] On the leaderboard among all the BitMex users, Prof. Liao's students competed globally and are now ranked 18th world-wide. Choose the WRONG answer below.
    a. SuDo research on the leaderboard is shown to have ~1300 BTCs, which is about US$90m. This number is revenue number, not the profit number.
3. [RegTech] Which below is NOT what recent news on "黃子佼" teaches you about AsData?
    a. 黃子佼事件導致創意私房（台版N號房）成立, 並爆紅.
4. Prof. Liao's lab does Bitcoin tracing type of "AsData". Which are NOT a transaction type? (10-pt)
    a. multiple-input, multiple-output transaction
5. Prof. Liao's lab's Bitcoin tracing can categorize an address into categories below. Which below is WRONG?
    a. Hacker
6. Prof. Liao mentioned UST and Luna. Which below is not a stablecoin?
    a. DAO
7. Prof. Liao's team predicted the downfall of UST in May 2022. Is Ethena USDe today a deja vu of UST in May 2022? Choose the WRONG statement. (10-pt)
    a. USDe today is already around 2.4B. It must become the next USDT.
8. Regarding Stanford HAI, choose the WRONG answer below.
    a. HAI stands for Humanoid-centered AI.
9. Which is NOT among the 3 giant boosters on brain's development in human history:
    a. Video game
10. During the AI age, we need to boost analytical thinking. Which is wrong about Bloom's taxonomy?
    a. Analytical thinking is among the lower 3-levels of knowledge.
11. [Raingo] Which is WRONG?
    a. About 50% of the April 17th class have used Raingo before.
12. Regarding Raingo & shared economy, which is WRONG?
    a. Nothing good can come out of this crisis. (這個危機不會是轉機.)

1.
    a. If I am a crude oil seller and the price is -$70 per barrel, I can profit if my storage and transport costs are lower than the payment received for taking the oil. For example, if storage costs $20 and transport costs $10 per barrel, I net $40 per barrel. Additionally, if the futures market indicates higher prices later (contango), I can sell at a profit in the future. If the futures market predicts that crude oil prices will rise in the future, I can store the oil and sell it later at a higher price. For example, if it is anticipated that the price of crude oil will recover to $50 per barrel or higher, selling it at that time will yield greater profits.
2. Tech-focused short-term investment is deeper and the holy grail of FinTech, to many young people.
3. Bitcoin pizza day falls on the same day as the world pIzza day. (15th pizza day 是對的)

4. 黃子佼事件導致創意私房（台版N號房）成立，並爆紅．

5. Token price drops as the number of retail investors who obtains tokens at low cost is too large, resulting in excessive selling pressure

6. Shut down mining machine and sell Bitcoin

7. Quantitative easing

8. Founding AI security company Endpass in Sillcon Vally; Rasing fund from Y Combinator

9. Arrest Bitcoin Hacker and seize their Bitcoins: Still need legal process to decide on ownership

10. It is a transaction used to return funds to a previous owner

11. Maximum Entropy

12. Bit

13. Encrypt data for privacy preservation

14. Post-quantum signature "Dilithium" can help BTC's signature to become quantum-resistant.

15. Maximum Entropy

16. Basis cost

17. Hacker

18. Reason 2: MSTR in NASDAQ gives investors to trade BTC with leverage (買現股自帶融資槓桿又不會被margin call) **(Assignment A)**

19. Speeding up the solution of complex optimization problems

20. Investors purchase MSTR (MicroStrategy) convertible bonds instead of buying Bitcoin directly because the bonds offer the potential for both interest income and capital appreciation while providing downside protection. The bonds can convert into shares of MicroStrategy, which indirectly gives exposure to Bitcoin due to the company's significant Bitcoin holdings, but also allows investors to benefit from the company's other business operations. Additionally, convertible bonds are typically less volatile than direct Bitcoin investments and provide a fixed income stream.
投資者購買MSTR（MicroStrategy）的可轉換債券而不是直接購買比特幣，因為這些債券既提供利息收入的潛力，也提供資本增值的機會，同時還提供了 downside protection.。這些債券可以轉換為MicroStrategy的股票，這間接使投資者能夠接觸到比特幣，因為該公司持有大量的比特幣，但也使投資者能夠從該公司的其他業務運營中受益。此外，可轉換債券通常比直接投資比特幣的波動性小，並提供固定的收入來源。

21. 由於MicroStrategy持有214.4萬個比特幣，MSTR的估值主要受比特幣價格的影響。要計算MSTR的有效槓桿倍數可以用這個公式估算：槓桿倍數 = 比特幣持有量的市場價值 / 企業價值（EV）。MicroStrategy的企業價值（EV）計算方式為：市值 + 債務 - 現金及現金等價物。比特幣持有量的市場價值為MicroStrategy持有的比特幣數量乘以當前比特幣的價格。
假設MicroStrategy的市值為60億美元。該公司有20億美元的債務和5億美元的現金。企業價值EV=\$6B+\$2B-\$0.5B=\$7.5B。

MicroStrategy持有214,400個比特幣。假設目前市場上比特幣價格為30,000美元。比特幣持有量的市場價值=214,400×$30,000 ≈ $6.4B。則槓桿倍數= $6.4B / $7.5B ≈ 0.85

20. Investors might choose MSTR bonds instead of buying Bitcoin directly for a few reasons. These bonds mix the stability of bonds with the chance to convert them into stocks, which helps balance out Bitcoin's ups and downs. Also, because MicroStrategy owns a lot of Bitcoin, buying their bonds lets investors profit from Bitcoin's price going up without worrying about storing and securing cryptocurrency. Plus, there could be tax and rule benefits for companies or some people who pick bonds over cryptocurrencies, which makes MSTR bonds a good choice for dealing with Bitcoin's market changes.

21.To calculate MicroStrategy's (MSTR) effective leverage multiple dominated by its Bitcoin holdings, you need to determine the company's total market capitalization, the total value of its Bitcoin holdings, and its enterprise value (EV). The market capitalization is obtained by multiplying MSTR's stock price by its outstanding shares. The total value of Bitcoin holdings is found by multiplying the number of Bitcoins held by the current Bitcoin price. The enterprise value is calculated by adding MSTR's total market capitalization to its total debt and subtracting its cash and cash equivalents. Finally, the effective leverage multiple is the ratio of the total Bitcoin value to the enterprise value.(Effective Leverage Multiple = Total Bitcoin Value/ Enterprise Value (EV)