Homework1 - Problem 1 - My Solution

1. Almost all recently issued credit cards are EMV cards, which have a chip that can store data in a much more secure way than magnetic strips. There are two authentication methods when using an EMV card: Chip and PIN or Chip and Signature. Do research and compare the two methods. What might be the reasons for countries/companies to adopt Chip and PIN, and what might be the reasons for adopting Chip and Signature, especially in the United States?

Answer:

Chip and PIN:

- The card holder inserts the EMV chip card into a terminal and enters 4-6 digit PIN for authentication.
- This PIN acts as a second factor of authentication, reducing fraud from stolen cards.
- THis is commonly used in Europe, Canada, and many other countries.
  Chip and Signature:
- The card holder inserts the EMV chip car into a terminal and signs receipt to authorize the transaction.
- The signature is compared by the cashier(mostly visually), which is weaker form of authentication.
- Predominantly, it is used in the United States.

The below table is the comparision b/w them:

Feature	Chip and PIN	Chip and Signature
Authentication Method	Requires PIN(Personal Identification Number)	Requires cardholder's signature
Security Level	High - PIN is harder to forge than a signature	Lower - Signatures can be easily forged or no checked properly
Fraud Prevention	Protects against lost/stolen card fraud	Less secure against stolen cards(thieves can forge a signature)
Ease of Use	Slightly less convenient(requires PIN entry)	More Convenient(just sign, no PIN to remember)
Transaction Speed	Faster - PIN entry is quick and verified electronically	Slower - Requires cashier verification and sometimes manual approval.
Common Regions	Used in Europe, Canada, Australia, India	Mostly used in the US
Interoparability	Preferred Internationally for ATM and POS transaction	May cause issues when travelling abroad(many countries require PIN)
Merchant Risk	Lower risk - PIN ensures stronger authentication	Higher risk - Merchant assumes liability for fraud if signature is not verified properly.

Reasons for Countries/Companies choosing Chip and PIN:

1. Enhanced Security Against fraud:
   - PINs are harder to forge compared to signatures
   - Reduces lost/stolen card fraud, as PIN authentication is required for transactions
   - Protects against card-present fraud, especially for ATMs and high-risk transactions.
2. Global Standard and Interoperability:
   - Most coutries outside the US use Chip and PIN(like Europe, Canada Australia).
   - It encourages global compatibility and makes international travel smoother for cardholders.
3. Better Customer Experience:
   - Fast transaction process than signature based auth, especially at self-checkout terminals.

Reasons for the US preferring Chop and Signature:

1. **Legacy Infrastructure** – The U.S. had a long-established signature-based payment system, making it easier to continue using signatures rather than upgrading to PIN-based terminals.
2. **Consumer Convenience** – American consumers are more familiar with signing receipts than entering PINs, reducing friction at checkout.
3. **Merchant Cost Savings** – Upgrading to PIN-enabled terminals requires additional costs, which many businesses preferred to avoid.
4. **Liability Shift Strategy** – U.S. card networks transferred fraud liability to merchants instead of mandating PIN usage, making signature authentication more acceptable.
5. **Credit vs. Debit Differences** – U.S. credit cards typically use signatures, while PINs are more common for debit cards, allowing credit card transactions to remain signature-based for ease of processing.

> Currently, US has slowly moved towards PIN adoption, especially for debit cards(I use PIN) and high-value transactions.
> Contactless payments and biometric authentication may reduce reliance on both PINs and signatures in the future.