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Section 70
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Assignment 5

# Problem 1

In theory, you would need at least 12 characters to secure the key. We can find this with the information entropy formula:

$$H = \log_2 N^L$$

Where $H$ is entropy, $N$ is the number of bits provided per symbol, and $L$ is sequence length. Solving for $L$:

$$96 = \log_2 256^L \implies L = 12$$

This is only a theoretic solution, in practice people do not achieve required entropy because they do not choose characters randomly. Specific letters and patterns are picked more often than others, a secure password requires truly random choices. Additionally, if using an an encoding scheme like ASCII, some symbols are reserved as control characters and will never show up, further reducing entropy.

# Problem 2

- Windows Hello + Password, Something you are and something you know
- Online banking text + password, something you have (your phone) and something you know
- Mobile banking fingerprint + password, something you are and something you know
- Token generator + fingerprint reader on a laptop, something you have and something you are
- Apple Face ID + pin, something you are and something you know

# Problem 3

DMZs enable an organization to create a "perimeter" around their LAN. All incoming and outgoing network traffic passes though this layer, while intra-network communication is unhindered. This enables the network administrators to provide security while keeping internal communications speedy. It also enables security systems to focus their recourses on just the traffic passing through this layer.

# Problem 4

Pros of Signature Detection:

- Signature based detection systems can be expanded easily by extending the signature database
- Signature based systems are very good at stopping known threats
- Has a lower false positive rate that anomaly detection

Pros of Anomaly Detection

- Unlike signature detection, anomaly can prevent unknown attacks
- Can be tuned to new applications easily

A3 and A0 are outside of the threshold, this is anomalous behavior.