RAT Test Run

Question 1: Which of the following is an example of a passive attack?

A modifying packets in transit (man-in-the-middle).
B injecting forged DNS responses (spoofing).
C deleting routing updates to disrupt connectivity.
D eavesdropping (listening to traffic) without altering messages.

Question 2: Network Security is concerned with:

A confidentiality, integrity and authentication.
B access and availability.
C operational aspects.
D all of the options.

Question 3: An intruder may eavesdrop both data and control messages. However, modification, insertion and deletion of messages or their content may be even more destructive. Which layers of the networking stack can be affected by such activities?

A The Application and Transport layers.
B Only the Network layer.
C Only the Application layer.
D The Application, Transport, Network and Link layers.

Question 4: Cryptography and encryption/decryption have been widely used throughout history. However, care must be taken when handling cryptographic systems (e.g., symmetric and public key systems). Which of the following options is correct?

A **The method** for encoding/decoding data may be publicly known as long as secret keys (e.g., symmetric and private keys) are only known by the involved parties.
B **The method** for encoding/decoding data **and used keys must** be kept **secret** from everyone except the sender/receiver.
C A Certification Authority **must always** be present to **validate** the cryptographic keys.
D Public key systems must encrypt/decrypt **all data** using the defined public/private key pair.

Question 5: Using block ciphers in a simplistic way has the disadvantage that identical cleartext blocks produce identical ciphertext blocks. To solve this issue randomness can be introduced by using an Initialisation Vector (IV) in Cipher-Block Chaining (CBC). Considering this approach select the correct option:

A CBC requires that the IV is sent securely to the receiver before initiating the communication.
B CBC has a **negligible overhead** because after the first IV, each random block is derived from the previous block.
C CBC has **twice the overhead** than regular cipher block encryption because it must send a new random block for each data block.
D CBC can be used directly without need to adapt any protocols (e.g., over UDP).

Question 6: Public Key Cryptography is useful for:

A encryption and authentication, especially for large volumes of data.
B encryption, authentication and digital signatures.
C encryption only.
D digital signatures only.

Question 7: A Message Authentication Code (MAC):

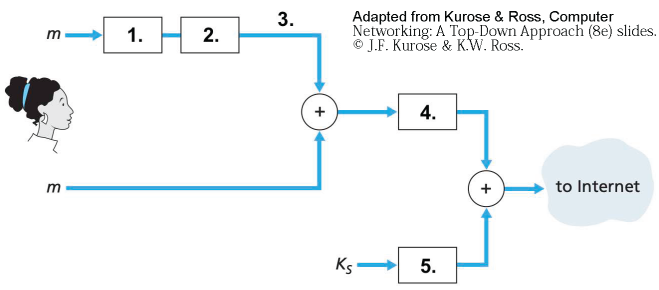
A provides **both** message integrity and digital signatures.
B can be used by routers to **verify** messages' integrity.
C requires **both** a hash function and an encryption algorithm.
D can be used by routers to uniquely identify which router created the message.

Question 8: Assume you receive an encrypted email (using your public key) allegedly signed by Alice, with an attached public key that validates the signature. Which statement is true?

A In order **to verify** the signature you need **your own private key**.
B You **can decrypt** the email but **not trust** that it has in fact been sent by Alice.
C In order **to decrypt** the email you need **Alice's private key**.
D You **can decrypt** the email **and trust** that it comes from Alice, using the attached public key without anything else.

Question 9: In this figure Alice uses symmetric key cryptography, public key cryptography, a hash function and a digital signature to provide secrecy, sender authentication and message integrity when sending an email to Bob. Considering the following nomenclature fill-in the figure's spaces from 1 to 5.

- $K_A^-(\cdot)$: Alice's Private Key
- $K_A^+(\cdot)$: Alice's Public Key
- $K_B^-(\cdot)$: Bob's Private Key
- $K_B^+(\cdot)$: Bob's Public Key
- $H(\cdot)$: Hash function
- $K_S(\cdot)$: Symmetric Key function for key K_S



A 1. $H(\cdot)$; 2. $K_A^-(\cdot)$; 3. $K_A^-(H(m))$; 4. $K_S(\cdot)$; 5. $K_B^-(\cdot)$
B 1. $H(\cdot)$; 2. $K_A^+(\cdot)$; 3. $K_A^+(H(m))$; 4. $K_S(\cdot)$; 5. $K_B^-(\cdot)$
C 1. $H(\cdot)$; 2. $K_A^-(\cdot)$; 3. $K_A^-(H(m))$; 4. $K_S(\cdot)$; 5. $K_B^+(\cdot)$
D 1. $H(\cdot)$; 2. $K_A^-(\cdot)$; 3. $K_A^-(H(m))$; 4. $K_A^+(\cdot)$; 5. $K_B^+(\cdot)$

Question 10: Suppose a Certification Authority (CA) contains Alice's certificate, which binds Alice's public key to Alice. This certificate is signed with:

A Alice's public key.
B The CA's private key.
C The CA's public key.
D Alice's private key.