Keep this side up on your desk until you are told to turn the page over.

This is a closed book quiz. No calculators.
Alice and Dave are in different parts of the world, and they want to communicate by email. They both want to prevent the eavesdropper Eve from reading their email messages, and so they plan to use Public-Key Encryption. Use this list of keys for your answers:

<table>
<thead>
<tr>
<th>Alice’s Public Key</th>
<th>Cindy’s Public Key</th>
<th>Edith’s Public Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>67</td>
<td>34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alice’s Private Key</th>
<th>Cindy’s Private Key</th>
<th>Edith’s Private Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>117</td>
<td>92</td>
<td>125</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bob’s Public Key</th>
<th>Dave’s Public Key</th>
<th>Frank’s Public Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>101</td>
<td>91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bob’s Private Key</th>
<th>Dave’s Private Key</th>
<th>Frank’s Private Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>109</td>
<td>58</td>
<td>68</td>
</tr>
</tbody>
</table>

Indicate what Alice and Dave should do by checking checkboxes and by filling in the keys.

1. **(2 points)** Dave wants to send a confidential message to Alice. What should Dave do first?
   - [ ] Encrypt
   - [ ] Decrypt
   - [ ] Sign
   - [ ] Verify
   - Message #1 using key ______.

2. **(2 points)** Dave sends the result of the above operation to Alice. What should Alice do to read the message?
   - [ ] Encrypt
   - [ ] Decrypt
   - [ ] Sign
   - [ ] Verify
   - Received Message #1 using key ______.

3. **(2 points)** Alice wants to send a confidential reply to Dave, and she wants him to be sure that it is from her. What should Alice do?
   - **First**
     - [ ] Encrypt
     - [ ] Decrypt
     - [ ] Sign
     - [ ] Verify
     - Message #2 using key ______.
   - **Then**
     - [ ] Encrypt
     - [ ] Decrypt
     - [ ] Sign
     - [ ] Verify
     - the result of the previous step using key ______.

4. **(2 points)** Alice sends the result of the above operation to Dave. What two steps should Dave perform so that he can read the encrypted message and ensure that it really is from Alice?
   - **First**
     - [ ] Encrypt
     - [ ] Decrypt
     - [ ] Sign
     - [ ] Verify
     - Received Message #2 using key ______.
   - **Then**
     - [ ] Encrypt
     - [ ] Decrypt
     - [ ] Sign
     - [ ] Verify
     - the result of the previous step using key ______.

5. **(2 points)** An advantage of Symmetric-Key Encryption is that it is much simpler compared to the operations of Public-Key Encryption above, but it has two big disadvantages. What is one disadvantage of Symmetric-Key Encryption?
Keep this side up on your desk until you are told to turn the page over.

This is a closed book quiz. No calculators.
Cindy and Frank are in different parts of the world, and they want to communicate by email. They both want to prevent the eavesdropper Eve from reading their email messages, and so they plan to use Public-Key Encryption. Use this list of keys for your answers:

Alice’s Public Key is 42, Cindy’s Public Key is 67, Edith’s Public Key is 34,
Alice’s Private Key is 117, Cindy’s Private Key is 92, Edith’s Private Key is 125,
Bob’s Public Key is 50, Dave’s Public Key is 101, Frank’s Public Key is 91,
Bob’s Private Key is 109, Dave’s Private Key is 58, Frank’s Private Key is 68.

Indicate what Cindy and Frank should do by checking checkboxes and by filling in the keys.

1. (2 points) Frank wants to send a confidential message to Cindy. What should Frank do first?

   \[ \begin{array}{ll}
   \Box \text{Encrypt} & \Box \text{Decrypt} \\
   \Box \text{Sign} & \Box \text{Verify} \\
   \end{array} \]

   \text{Message \#1 using key \ldots}.

2. (2 points) Frank sends the result of the above operation to Cindy. What should Cindy do to read the message?

   \[ \begin{array}{ll}
   \Box \text{Encrypt} & \Box \text{Decrypt} \\
   \Box \text{Sign} & \Box \text{Verify} \\
   \end{array} \]

   \text{Received Message \#1 using key \ldots}.

3. (2 points) Cindy wants to send a confidential reply to Frank, and she wants him to be sure that it is from her. What should Cindy do?

   \begin{align*}
   \text{First} & \quad \begin{array}{ll}
   \Box \text{Encrypt} & \Box \text{Decrypt} \\
   \Box \text{Sign} & \Box \text{Verify} \\
   \end{array} \quad \text{Message \#2 using key \ldots} \\
   \text{Then} & \quad \begin{array}{ll}
   \Box \text{Encrypt} & \Box \text{Decrypt} \\
   \Box \text{Sign} & \Box \text{Verify} \\
   \end{array} \quad \text{the result of the previous step using key \ldots}.
   \end{align*}

4. (2 points) Cindy sends the result of the above operation to Frank. What two steps should Frank perform so that he can read the encrypted message and ensure that it really is from Cindy?

   \begin{align*}
   \text{First} & \quad \begin{array}{ll}
   \Box \text{Encrypt} & \Box \text{Decrypt} \\
   \Box \text{Sign} & \Box \text{Verify} \\
   \end{array} \quad \text{Received Message \#2 using key \ldots} \\
   \text{Then} & \quad \begin{array}{ll}
   \Box \text{Encrypt} & \Box \text{Decrypt} \\
   \Box \text{Sign} & \Box \text{Verify} \\
   \end{array} \quad \text{the result of the previous step using key \ldots}.
   \end{align*}

5. (2 points) An advantage of Symmetric-Key Encryption is that it is much simpler compared to the operations of Public-Key Encryption above, but it has two big disadvantages. What is one disadvantage of Symmetric-Key Encryption?
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This is a closed book quiz. No calculators.
Edith and Bob are in different parts of the world, and they want to communicate by email. They both want to prevent the eavesdropper Eve from reading their email messages, and so they plan to use Public-Key Encryption. Use this list of keys for your answers:

Alice’s Public Key is 42, Cindy’s Public Key is 67, Edith’s Public Key is 34,
Alice’s Private Key is 117, Cindy’s Private Key is 92, Edith’s Private Key is 125,
Bob’s Public Key is 50, Dave’s Public Key is 101, Frank’s Public Key is 91,
Bob’s Private Key is 109, Dave’s Private Key is 58, Frank’s Private Key is 68.

Indicate what Edith and Bob should do by checking checkboxes and by filling in the keys.

1. (2 points) Bob wants to send a confidential message to Edith. What should Bob do first?
   \[
   \begin{align*}
   \text{Encrypt} & \quad \text{Decrypt} \\
   \text{Sign} & \quad \text{Verify}
   \end{align*}
   \]
   Message #1 using key \[\text{______} \].

2. (2 points) Bob sends the result of the above operation to Edith. What should Edith do to read the message?
   \[
   \begin{align*}
   \text{Encrypt} & \quad \text{Decrypt} \\
   \text{Sign} & \quad \text{Verify}
   \end{align*}
   \]
   Received Message #1 using key \[\text{______} \].

3. (2 points) Edith wants to send a confidential reply to Bob, and she wants him to be sure that it is from her. What should Edith do?
   \[
   \begin{align*}
   \text{Encrypt} & \quad \text{Decrypt} \\
   \text{Sign} & \quad \text{Verify}
   \end{align*}
   \]
   Message #2 using key \[\text{______} \].
   \[
   \begin{align*}
   \text{Encrypt} & \quad \text{Decrypt} \\
   \text{Sign} & \quad \text{Verify}
   \end{align*}
   \]
   the result of the previous step using key \[\text{______} \].

4. (2 points) Edith sends the result of the above operation to Bob. What two steps should Bob perform so that he can read the encrypted message and ensure that it really is from Edith?
   \[
   \begin{align*}
   \text{Encrypt} & \quad \text{Decrypt} \\
   \text{Sign} & \quad \text{Verify}
   \end{align*}
   \]
   Received Message #2 using key \[\text{______} \].
   \[
   \begin{align*}
   \text{Encrypt} & \quad \text{Decrypt} \\
   \text{Sign} & \quad \text{Verify}
   \end{align*}
   \]
   the result of the previous step using key \[\text{______} \].

5. (2 points) An advantage of Symmetric-Key Encryption is that it is much simpler compared to the operations of Public-Key Encryption above, but it has two big disadvantages. What is one disadvantage of Symmetric-Key Encryption?