Greetings from Granada, the capital of the Nasrid kingdom, the last remnant of the Al-Andalus Caliphate that was the cultural center of Western Europe during the “Dark Ages”. This is a closed-everything exam. The usual rules apply. There are eleven true/false questions. Since true/false exams are inherently error-prone, you get one free “wrong” answer. Write your answers in the right-hand table below. You have three hours, which should be plenty of time. Have a great break and I hope to see you all again.

<table>
<thead>
<tr>
<th>Print your name</th>
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<td>Sign for your honor</td>
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1. In a classical kernel-based operating system (e.g., Unix), processes enter the kernel through a protected hardware exception mechanism (trap, fault, interrupt) that transitions control to an exception handler installed by the kernel.

2. In a classical kernel-based operating system (e.g., Unix), the kernel stack of a process is accessible only to that process.

3. The FIFO-with-second-chance page replacement algorithm keeps the most frequently used pages resident in memory.

4. Hardware (MMU) support for per-page reference bits is necessary in order to implement effective page replacement algorithms such as Clock or FIFO-with-second-chance.

5. In a multilevel-feedback-queue scheduler, the overhead of selecting the next process or thread to run grows linearly with the number of processes/threads that are ready to run.

6. For bulk data transfers between two entities who already share a secret/symmetric/session key, encrypting the data is the fastest way to protect its integrity/authenticity.

7. If Alice has an asymmetric keypair and Bob knows the public key of Alice, then Bob can verify that any message originated from Alice by using the challenge/response protocol with nonces.

8. Accessing an e-commerce site with secure HTTP (https or HTTP over SSL/TLS) is vulnerable to a Man/Mallory-in-the-Middle attack in the case where the site uses a password rather than a certificate to authenticate the customer, and the customer’s password is compromised.

9. In Unix systems, a shell can wait for a command running in a child process to complete (or fail) by blocking in the exec*() system call.

10. To implement a producer/consumer bounded buffer (as in the soda machine example, Unix pipes, or the mailbox question on the midterm exam), using mutexes and condition variables for synchronization, it is necessary to use more than one mutex.

11. To implement a producer/consumer bounded buffer (as in the soda machine example, Unix pipes, or the mailbox question on the midterm exam), using mutexes and condition variables for synchronization, it is necessary to use more than one condition variable.