CS 111 Practice Quiz 2

Problem 1: You need to show all your work (write the solutions step-by-step) in order to receive credit for the following questions.

(a) Compute $8^9 \pmod 5$ by squaring.
(b) Compute $6^{-1} \pmod{13}$ using the method of linear combinations (listing multiples).
(c) Compute $5^{-1} \pmod{11}$ using Fermat's Little Theorem.
(d) Solve: $5x \equiv 7 \pmod{11}$.

Problem 2:

(a) In the RSA, Bob is considering the following choices for the values of p, q and e:

- $p = 13, q = 5, e = 3$
- $p = 11, q = 11, e = 3$
- $p = 3, q = 31, e = 5$

For each choice determine whether it's correct or not, and justify your answer.

(b) After thinking a little bit more, Bob chooses $p = 5$, $q = 11$ and $e = 7$.

(i) Determine the values of n and $\phi(n)$.
(ii) Determine d. Show your work.
(iii) Encrypt $M = 2$. Show your work.

Problem 3: For each statement tell whether it is true or false and justify your answer.
(a) For all nonnegative integers n, $n^2 + 5n + 6$ is an even number.
(b) For all positive integers n, $n^2 + 5n + 6$ is not a prime number.

Academic integrity declaration. Please provide a statement confirming that you completed this assignment all by yourself. (For example, *"Hereby I affirm that I completed this test on my own, without any unauthorized help."*) and sign it. Submissions without the signed statement will not be graded.