Public Key Encryption: Part 1 (for self-study)

1. Write the following composite numbers as a multiplication of their prime factors.
   (a) 72
   (b) 111
   (c) 1024
2. Complete the following modular arithmetic operations and determine the result:
   (a) $(32 + 18) \bmod 7$
   (b) $(12 \times 8) \bmod 7$
   (c) $(56 + 125) \bmod 11$
   (d) $(33 - 45) \bmod 9$
   (e) $100^4 \bmod 7$
   (f) $10^{-1} \bmod 31$
   (g) $13^{-1} \bmod 19$
3. Using the "Square and Multiply" modular exponentiation algorithm calculate the following:
   (a) $8^{57} \bmod 11$
   (b) $15^{62} \bmod 31$