1. Consider the prime $p = 9929$ and the primitive element 2.
   a) Show the steps of the Diffie-Hellman between Alice and Bob for $a = 1983$ and $b = 2014$.
   b) What is the value of the agreed secret key?

2. Consider the RSA public and private key pairs: $(e, n) = (17, 902801)$ and $(d, n, p, q, \phi) = (423953, 902801, 911, 991, 900900)$.

   - Given $M_1 = 500000$, compute $C_1 = M_1^e \pmod{n}$.
   - Given $C_2 = 707631$, compute $M_2 = C_2^d \pmod{n}$.

3. RSA with three primes would also work: $n = pqr$, $\phi(n) = (p-1)(q-1)(r-1)$, $\gcd(e, \phi(n)) = 1$, and $d = e^{-1} \pmod{\phi(n)}$.
   a) Setup an example RSA public/private key pair using primes 29, 31, 37, and $e = 17$.
   b) Encrypt $m = 10000$ and then decrypt the ciphertext.
   c) Explain why RSA with three primes algorithm is not preferred.