In the following show all work and cite all sources.

1. Use Fermat factorization to factor 43947. Show all steps.
2. Alice has published the modulus N=22987 and exponent e=7. Use a three-letter base twenty-six encoding and RSA to encipher the following message: LIE

(Note: the three-letter base 26 encoding is x1 + x2\*26 + x3\*262 where x1, x2 and x3 are the decimal representations mod 26 of the first three letters of your message. For example the message WOU would be 22 + 14\*26 + 20 \* 262 = 13906.)

1. Bob has chosen primes p= 113, q = 157, and exponent e = 113.
   1. Determine his public modulus and private key for RSA.
   2. If he receives the message 13667, then decipher and determine the plaintext (assuming it was encoded using the base 26 encoding described above).
2. The following message is an encipherment by RSA of a five-letter message using modulus m=11885807 and exponent e=6395437: y = 8468422. Perform a cryptanalysis using any means at your disposal (except copying a friend) and obtain the message. Cite all sources and explain your method.