1. Find the prime factorization of 29!.

2. Let $p = 11$ and $q = 17$. So $n = pq = 187$ and $\phi(n) = (p-1)(q-1) = 160$. Bob chooses his public exponent $e = 27$ which is coprime with 160. Then he publishes his public key $(187, 27)$ openly.

(a) Compute Bob’s private key.

(b) Suppose that Alice wants to send an integer 152 to Bob. Compute the cyphertext $c$ she will send in the open channel.

(c) After receiving the cyphertext $c$, check that Bob is able to recover the original integer 152 using his private key.

Note. This question is for illustration of the RSA algorithm only. In real world applications, one needs to take $p$ and $q$ so large that it is impossible to factorize $n$ within a reasonable amount of time.