Q1a: We have that Alice's public key is $(3225997, 13)$. We compute $\phi(3225997) = 1696 \cdot 1900 = 3222400$. To find Alice's private key, we wish to find an f_1 such that

$$e_1 f_1 \equiv 13 f_1 \equiv 1 \mod 3222400, \gcd(f_1, 13) = 1$$

By python code (allowed on Piazza), we compute that $f_1 = 247877$ and $\gcd(247877, 13) = 1$. Therefore, Alice's private key is $(3225887, 247877)$

Q1b: Given that Bob's private key is $(3250447, 17)$, we wish to compute his public key e_2 by solving

$$e_2 f_2 \equiv 17 e_2 \equiv 1 \mod \phi(3250447)$$

Using python, we see that $e_2 = 954953$. Hence Bob's public key is $(3250447, 954953)$

Q1c: We compute the encryption of 7 as $7^{13} \equiv 2642506 \mod (3225887)$ using google.

Q1d: We compute the sign of 11 as $11^{17} \equiv 2494952 \equiv \mod 3250447$