Student Number: [redacted] Name: Bryan Hoang

2. (10 points)

(a) **Answer:**

- $\boxed{\text{Yes}}$, e is indeed an encryption function.
- It's associated decryption function d is $\boxed{d_k(c) \equiv k - c \pmod{N}}$.

(b) **Answer:**

- $\boxed{\text{No}}$, e is not an encryption function since it is not injective.
- We can make it an encryption function by restricting the set of keys to $\mathcal{K} \equiv (\mathbb{Z}/N\mathbb{Z})^* \pmod{N}$. Then it will have an associated decrytion function of $d_k(c) \equiv k^{-1}c \pmod{N}$

(c) **Answer:**

- $\boxed{\text{No}}$, e is not an encryption function since it is not injective.
- We cannot make it an encryption function by restricting the set of keys.