

Jose
Gutierrez

$$3) f: x \rightarrow 5x+7 \pmod{26}$$

h	o	w	a	r	e	y	o	o
7	14	22	0	17	4	24	14	20

- h) $5(7)+7 = 42 \equiv 16 \pmod{26} \rightarrow Q$
o) $5(14)+7 = 77 \equiv 25 \pmod{26} \rightarrow Z$
w) $5(22)+7 = 117 \equiv 13 \pmod{26} \rightarrow N$
a) $5(0)+7 = 7 \pmod{26} \rightarrow H$
r) $5(17)+7 = 92 \equiv 14 \pmod{26} \rightarrow O$
e) $5(4)+7 = 27 \equiv 1 \pmod{26} \rightarrow B$
y) $5(24)+7 = 127 \equiv 23 \pmod{26} \rightarrow X$
o) $5(14)+7 \equiv 25 \pmod{26} \rightarrow Z$
u) $5(20)+7 \equiv 3 \pmod{26} \rightarrow D$

Ciphertext: Q Z N H O B X Z D

since $\gcd(5, 26) = 1$ then inverse exist
so $5x \equiv 1 \pmod{26}$

$$x = 21 \\ \rightarrow 5(21) = 105 \equiv 1 \pmod{26}$$

Decryption (n) $5x+7 \equiv y \pmod{26}$
 $21(5)x + 21(7) \equiv 21y \pmod{26}$
 $\rightarrow x + 147 \equiv 21y \pmod{26}$
 $x \equiv 21y - 147 \equiv 21y - 17 \pmod{26}$

Check) $21(13) - 17 = 256 \equiv 22 \pmod{26}$ $f^{-1}: 13 \rightarrow 22 \checkmark$
 ~~$21(24) - 17 = 487 \equiv 19 \pmod{26}$ $f^{-1}: 23 \rightarrow 24 \checkmark$~~
 $21(23) - 17 = 466 \equiv 24 \pmod{26}$ $f^{-1}: 23 \rightarrow 24 \checkmark$