Homework 26 Solutions

Problems

Comparing this homework assignment to other homeworks yields the following substitution table:

Plain text	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Encrypted	C	V	L	G	D	O	A	F	B	?	N	Y	X	Q	R	W	T	S	E	U	M	P	I	H	J	?

and it's inverse

Encrypted	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Plain text	G	I	A	E	S	H	D	X	W	Y	?	C	U	K	F	V	N	O	R	Q	T	B	P	M	L	?

We can now decode the problem:

1. **Compute the seventh root of four (modulo eighty-five)**

   $\phi(85) = (5-1)\cdot(17-1) = 64$.

   $\frac{1}{7} \equiv -9 \pmod{64}$.

   Therefore $4^{1/7} \equiv 4^{-9} \equiv 4^{55} \equiv \boxed{64} \pmod{85}$.