Show/prove that…
Congruence mod 7 is an equivalence relation

Reflexive ($a \equiv a \pmod{7}$):
proof: If *a* is an integer
$a - a = 0$
so $a - a = 7 \cdot 0$
so $a - a$ is a multiple of 7
So $a \equiv a \pmod{7}$

Symmetric (if $a \equiv b \pmod{7}$ then $b \equiv a \pmod{7}$
proof: if $a \equiv b \pmod{7}$
$a - b = 7n$ for some integer n
$-1(a-b) = -1(7n)$
$-a + b = -7n$
$b - a = 7(-n)$
$b \equiv a \pmod{7}$

Transitive (if $a \equiv b \pmod{7}$ and $b \equiv c \pmod{7}$ then $a \equiv c \pmod{7}$)
proof: if $a \equiv b \pmod{7}$ and $b \equiv c \pmod{7}$
so, $a - b = 7n$ and $b - c = 7m$ for some integers n and m
so, $a = b + 7n$ and $c = b - 7m$

$$\begin{aligned} a - c &= (b+7n) - (b-7m) \\ &= b + 7n - b + 7m \\ &= 7n + 7m \\ &= 7(n+m) \end{aligned}$$

$a \equiv c \pmod{7}$