Third Writing Assignment, Math220

Prove the following

(1) Let a, b, c, d and n be integers with $n > 0$. If $a \equiv b \mod n$ and $c \equiv d \mod n$, then $ac \equiv bd \mod n$.
(2) Let a, b and n be integers with $n > 0$. If $a \equiv b \mod n$, then $a^3 \equiv b^3 \mod n$.
(3) Let a, b, k and n be integers with $n > 0$ and $k > 0$. If $a \equiv b \mod n$, then $a^k \equiv b^k \mod n$.
(4) Prove or find a counterexample: Let a, b, c and n be integers with $n > 0$. If $ac \equiv bc \mod n$, does it follow that $a \equiv b \mod n$.