Worksheet 2

1. For $n \geq 1$, prove that
$$7|5^{2n} + 3.2^{5n-2}.$$

2. Find the remainders when 2^{50} and 41^{65} are divided by 7.

3. If the integer a is not divisible by 2 or 3, then $a^2 \equiv 1 \mod 24$.

4. Prove that whenever $ab \equiv cd \mod n$ and $b \equiv d \mod n$ with $\gcd(b, n) = 1$, then $a \equiv c \mod n$.