Name:

Problem 1: *True or false: Recall that* $\phi(12) = 12\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right) = 4$. *Then*

$$3^4 \equiv 1 \pmod{12}.$$

For full credit, please justify your answer with one sentence.

Solution: This statement is false. Even though it is true that $\phi(12) = 4$, it is not true that $3^4 \equiv 1 \pmod{12}$. Since the whole statement is not true, it is false.
In this case it is easy to compute that $3^4 \equiv 9 \pmod{12}$. This does not contradict Euler's theorem since $(3, 12) \neq 1$, which is a necessary condition for Euler's theorem to apply.