

Name _____

Quiz #15
Mathematics 309a Abstract Algebra
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(Euler's Theorem) If a is an integer relatively prime to n , then $a^{\phi(n)} - 1$ is divisible by n , that is $a^{\phi(n)} \equiv 1 \pmod{n}$, where ϕ is the Euler phi-function.

A. $\phi(43) =$ _____ .

B. Prove that 43 divides $n^{42} - 1$ for any positive integer n .

C. Prove that $24356456^{42} - 1$ is not a prime.

D. The remainder of dividing 2^{1764} by 43 is _____ .

E. The remainder of dividing 3^{1766} by 43 is _____ .