1. Verify that 341 passes the Fermat primality test with base 2 but fails the Miller-Rabin primality test with base 2. Use your computation to produce an integer $x$ with $x^2 \equiv 1 \pmod{341}$ but $x \not\equiv \pm 1 \pmod{341}$ and then use this information to factor 341.
2. Bob is using RSA with modulus $n = 341$ and encryption exponent $e = 7$. He receives a cyphertext $c = 16$. What is the plaintext message?
3. Let $a, b$ be relatively prime integers and $u, v$ be integers with $au + bv = 1$. Let $x = au - bv$. Show that $x \equiv 1 \pmod{b}$ and $x \equiv -1 \pmod{a}$. Find $u, v, x$ when $a = 23, b = 31$. 