Abstract: Artin’s famous primitive root conjecture states that if \( n \) is an integer other than \(-1\) or a square, then there are infinitely many primes \( p \) such that \( n \) is a primitive root modulo \( p \). We will discuss a number field version of this conjecture and its connection to the following Euclidean algorithm problem. Let \( \mathcal{O} \) be the ring of integers of a number field \( K \). It is well-known that if \( \mathcal{O} \) is a Euclidean domain, then \( \mathcal{O} \) is a unique factorization domain. With the exception of the imaginary quadratic number fields, it is conjectured that the reverse implication is true. This is joint work with M. Ram Murty.