Abstract: Several problems in commutative algebra find a motivation in the study of singularities in algebraic geometry. In fact, thanks to classical work of Zariski and Grothendieck, every geometric question about algebraic varieties or schemes can be translated into an algebraic problem about commutative rings. In this framework, regular rings correspond to non-singular algebraic varieties or schemes, and various algebraic methods have been developed to determine how far a ring is from being regular. In this talk, I will explain how homological algebra can be used to determine whether a ring is regular or when it corresponds to a variety which is complete intersection. In particular, I will discuss the celebrated Auslander-Buchsbaum-Serre’s Theorem and a longstanding conjecture of Vasconcelos, which has been recently proved using tools from homotopy theory.