

The thesis is studying irreducible factorization in rings of integers of an algebraic number fields. To study factorization, the unique factorization of ideals into prime ideals is extremely useful. The irreducible factorization of an element x in a way corresponds with factorization of principal ideal, generated by x , into prime ideals. The class number is defined and the thesis is focusing on rings with class numbers 2 and 3. In rings with those class numbers the thesis characterizes irreducible elements and irreducible factorization, which is not unique. The Carlitz theorem, which fully characterizes rings with class number at most 2, is proved. Then the thesis extends some characteristic properties for rings with class number 3. At the end there is demonstrated searching for all irreducible factorizations of the number 126 in algebraic number ring $\mathbb{Z}\left[\frac{1+\sqrt{-23}}{2}\right]$.