The thesis deals with the basic notions of the (system) reliability theory as e.g., failure, time to failure, reliability function, mean time to failure, intensity of failures, etc. It also describes probability distributions that are frequently used in the field of (system) reliability. Fourth chapter is focused on the reliability of basic systems as, e.g., serial, prallel, circle and star, using Boolean algebra and Markov chains. The last part of the thesis describes the simulation of complex systems. This part also includes two programmes. The first one enables a simulation of reliability of basic systems and the second reliability of the network of the building MFF UK, Karlín.