Loading a planet's surface causes it to deform. The evolution of this deformation is influenced by the internal structure of the planet. In this thesis we use a one-dimensional numerical model of Maxwell viscoelastic deformation of a spherical shell to test the effect of a few selected parameters of lithosphere and mantle on the specific case of loading of the Martian surface by the North Polar cap. The ice sheet is less than 10 million years old and the measured surface deformation under it is about 100 m. We chose elastic lithosphere thickness and viscous profile of the lithosphere and mantle as the model parameters to be tested, the other parameters according to the results of InSight mission. We made the viscosity profile either piecewise constant or defined by an Arrhenius formula. The magnitude of deformation is mostly influenced by the elastic lithosphere thickness. To realize the deformation observed on Mars, our models with piecewise constant viscosity require the lithospheric thickness to be $T_e = 200 - 300$ km, Arrhenius formula based models require $T_e \geq 300$ km.