ABSTRACT. We are concerned with the problem of finding hypersurfaces of constant Gauss curvature (K-hypersurfaces) with prescribed boundary Γ in R^{n+1}, using the theory of Monge-Ampère equations. We prove that if Γ bounds a suitable locally convex hypersurface Σ, then Γ bounds a locally convex K-hypersurface. The major difficulty lies in the lack of a global coordinate system to reduce the problem to solving a fixed Dirichlet problem of Monge-Ampère type. In order to overcome this difficulty we introduced a Perron method to deform (lift) Σ to a solution. The success of this method is due to some important properties of locally convex hypersurfaces, which are of independent interest. The regularity of the resulting hypersurfaces is also studied and some interesting applications are given.