1. Let $F(u,v) = (f(v)cos(u), f(v)sin(u), g(v))$ be a paramterization of a surface of revolution. Calculate the entries E, F, G of the matrix of the first fundamental form and Cristoffel symbol: $\Gamma^1_{11}, \Gamma^2_{11}, \Gamma^1_{12}, \Gamma^2_{12}, \Gamma^1_{22}, \Gamma^2_{22}$. Write down differential relations expressing Γ^k_{ij} interms of E, F, G. How these formulas look like in the case when the surface is a cylinder?

2. Show that if $f(u,v)$ is an orthogonal parametrization of a surface, that is $F = 0$ then

$$K = -\frac{1}{2\sqrt{EG}}[(\frac{E_v}{\sqrt{EG}})_v + (\frac{G_u}{\sqrt{EG}})_u]$$

3. Show that the matrix of the first fundamental from satisties $E = G, F = 0$ then

$$K = \frac{-1}{2E}\Delta(logE)$$

where Δ is the Laplacian.