

HOME WORK 3

1. Let S be a surface of revolution with parametrisation

$$\sigma(u, v) = (f(u) \cos v, f(u) \sin v, g(u)) .$$

Show that a rotation $R_\theta: S \rightarrow S$ around the z -axis with angle θ is an isometry.

2. Consider the surface $S = \{(x, y, z) \in \mathbb{R}^3 \mid xyz = 1\}$. Determine all umbilic points on S , and compute the normal curvature in the umbilic points.
3. Show that all points on the surface $S = \{(x, y, z) \in \mathbb{R}^3 \mid z = x + y^3\}$ are planar or parabolic. Show that through every point (x_0, y_0, z_0) on the surface passes a line of curvature, which contains a planar point. Determine the line of curvature and the planar point.

Solutions to be handed in monday March 5, 2009.