

Exercise sheet 7

Curves and Surfaces, MTH201

For all these questions, $\hat{\mathbf{n}}(p) := \sigma_x(p) \times \sigma_y(p)$

1. Prove that $\hat{\mathbf{n}}(\gamma(t))$ is perpendicular to $\mathbf{T}(t)$.
2. Prove that $\mathbf{N}(t) = \hat{\mathbf{n}}(t)$ if and only if $\kappa_g(t) = 0$
3. Prove that the area can be expressed entirely in terms of the first fundamental form.

$$A_\sigma(R) = \int_R \sqrt{E(x,y)G(x,y) - F^2(x,y)} dx dy$$