Differential Geometry of Curves and Surfaces

Homework 14

Due on January 5

1. Show that:

   (a) The minimal surface corresponding to the Weierstrass-Enneper data $f(w) = -ie^w$, $g(w) = ie^{-w}$ is the **catenoid**, that is, the surface of revolution generated by the graph of the hyperbolic co-sine.

   (b) The minimal surface corresponding to the Weierstrass-Enneper data $f(w) = -e^w$, $g(w) = ie^{-w}$ is the **helicoid**, that is, the surface generated by a horizontal straight line sliding along the z-axis while rotating uniformly about this axis.

   (c) These two surfaces are **locally isometric**, that is, their first fundamental forms coincide when written in appropriate coordinates.