These problems from do Carmo:

- 3-2: 5, 7
- 3-3: 5abc

Also:

1. Compute the principle curvatures of a surface in terms of $K$ and $H$.

2. An asymptotic curve in a surface is a curve that has 0 normal curvature everywhere. Show that if $\alpha$ is an asymptotic curvature, then $K(\alpha(t)) < 0$ for every $t$ in the domain of $\alpha$.

3. The tractrix is the curve given by
   \[ \alpha(v) = (\sin(v), \cos(v) + \log(\tan(v/2))) \].

You saw this curve before in the first homework (problem 1-3.4).

   a. Sketch the trace of this curve for $v \in (0, \pi/2)$.

   b. Let $S$ be the surface of revolution of this curve (with the domain $(0, \pi/2)$). Sketch this surface and compute the Gaussian and mean curvatures of $S$. (Be careful about using Example 4 of section 3-3: the curve $\alpha$ does not have unit speed!)

   c. Notice that the Gaussian curvature of $S$ is a negative constant. For this reason we call $S$ the pseudosphere. But any surface with constant negative Gaussian curvature is quite different from the sphere. Name two properties that the sphere has that a surface with constant negative Gaussian curvature cannot have (besides having (constant) positive Gaussian curvature!).