Differential Geometry 2013-2

[1] Find a parametric equation for the plane curve with the constant curvature 7.

[2] Consider the parametric equation

$$X(u,v) = u(1,0,0) + v(0, 2\cos u, 2\sin u).$$

(2.1) Show that this defines a smooth surface in $\mathbf{R}^3$.

(2.2) Show that its Gauss curvature is everywhere nonpositive.

[3] Consider the plane curve parametrized by

$$X(t) = (3\cos t, 3\sin t, 2t).$$

Find its binormal vector.