

## Introduction to Differential Geometry

1. Compute the curvature and torsion of the curve given by

$$\gamma(t) = (a \cos(t/c), a \sin(t/c), tb/c),$$

where  $c = \sqrt{a^2 + b^2}$ .

2. (a) State the Fundamental Theorem of Surfaces.  
(b) Compute the first and second fundamental forms on the sphere given by

$$x^2 + y^2 + z^2 = 4$$

3. (a) State the Gauss-Bonnet Theorem.  
(b) Use your answer above, explain the following statement.

*Triangles on the sphere are fatter than triangles on the plane.*