

Exercise Sheet 9

Due: 18.12.2013 in the tutorials, 4pm!

You should work in groups of two. Don't forget to put your names and student ID numbers on the solution you hand in!

Exercise 9.1 (Parallel Transport and Gauß-Bonnet, 3+3 Points). Let $\gamma_i : [0, 1] \rightarrow M_h$ be the closed curves (i.e. $\gamma_i(0) = \gamma_i(1)$) on the cube surface M_h shown below, $i = 1, 2, 3$, and let v be an initial tangent vector at $\gamma_i(0)$.

1. Compute for all three cases the angle defect $\beta_i^N(1) - \beta_i^N(0)$ for the parallel transport of v along γ_i as well as the integrals $\int_0^1 \kappa_{g,i}(t) dt$ to verify the formula from the lecture (here $\kappa_{g,i}$ denotes the geodesic curvature of the curve γ_i).
2. Verify the discrete Gauß-Bonnet formula for the region bounded by γ_i in all three cases (you may choose the "outer" or "inner" region in each case, depending on your preferred orientation).

