DIFFERENTIAL TOPOLOGY
PROBLEM SHEET 14

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Problem 1 (10, Gaussian curvature)**.** Compute the Gaussian curvature at the point zero for the general paraboloid given by the equation $Z = aX^2 + bXY + cY^2$ where a, b, c are real numbers.

Problem 2 (10, Euler characteristic)**.** Let M^m, N^m for $m \geqslant 1$ be two closed connected manifolds. Compute the Euler characteristic of their connected sum in terms of their own Euler characteristic.

Problem 3 (10, transition function)**.** Show that for any vector bundle for any two vector bundle charts with non-empty overlap the transition function is continuous.

Problem 4 (10, line bundles on $\mathbb{R}$)**.** Find up to isomorphism all line bundles on $\mathbb{R}$.