Suggested Topics

Suggestions from Herman

- Fary-Milnor Theorem: The total curvature of a knotted, simple closed curve in Euclidean 3-space is $> 4\pi$. References: Baby doCarmo pp390-404 and Chern: Curves and Surfaces in Euclidean Space.
- Moser: On the volume elements on a manilofd (1965). Any two volume elements on a closed manifold with the same total volume are equivalent via a diffeomorphism of the manifold.
- Gluck-Warner: Great circle fibrations of the 3-sphere. (Duke Math. Journal 1983). The space of all great circle fibrations of the 3-sphere deformation retracts to the subspace of the Hopf fibrations.
- Cappell-Shaneson (Annals of Math. 1976). There exist inequivalent knots with the same complement.
- The Carpenter's Rule Problem. Connely-Demaine-Rote "Straightening polygonal arcs and convexifying polygonal cycles" (2000)
- Connelly (1977). There exist polyhedral embeddings of $\mathbb{S}^2$ in $\mathbb{R}^3$ which are flexible.

Suggestions from Wolfgang

- 2-dimensional orbifolds (reference: Scott "The Geometries of 3-manifolds")
- 4-dimensional orbifolds (reference: Weinstein-Moore-Chen)
- Embeddings $M^n \subset \mathbb{R}^{n+2}$
- Hopf Fibrations
- the Hitchin-Thorpe Inequality

Suggestions from Brian

- Cheeger-Gromov Theory. Suggested reference: Greene-Wu "Lipschitz convergence of Riemannian manifolds" (1988). This material is foundational to much of modern differential geometry.
- Riemannian moduli space of Einstein manifolds. Anderson, "Ricci curvature bounds and Einstein metrics on compact manifolds" (1989). Also Bando-Kasue-Nakajima "On construction of coordinates at infinity on manifolds with fast curvature decay and maximal volume growth" (1990)
- Cheeger-Colding Theory. Foundational reference: Cheeger-Colding, "Lower boudns on Ricci curvature and the almost rigidity of warped products" Annals of Math. (1996)