

“Singularities, Black Holes, Thermodynamics in Relativistic Spacetimes”: Problem Set 1 (differential manifolds)

How can we lose when we’re so sincere?

Charlie Brown

1. Malament (2012), problems 1.1.1–1.1.4
2. Wald (1984), problems 2.1–2.2
3. Explicitly construct charts to define the differential structure of \mathbb{S}^3 ; how does the resulting space differ from an ordinary solid ball in 3-dimensional Euclidean space? (In other words, explain why \mathbb{S}^3 is not the interior-plus-boundary of \mathbb{S}^2 in \mathbb{R}^3 .)

References

- Malament, D. (2012). *Topics in the Foundations of General Relativity and Newtonian Gravitational Theory*. Chicago: University of Chicago Press. Uncorrected final proofs for the book are available for download at <http://strangebeautiful.com/other-texts/malament-founds-gr-ngt.pdf>.
- Wald, R. (1984). *General Relativity*. Chicago: University of Chicago Press.