

MODERN GEOMETRY, FALL 2017: PROBLEM SET 12
Due Thursday, December 21

Note: these problems related to the discussion in Chapter 31 of *Differential Geometry*, by Loring Tu, available here:

<https://link.springer.com/book/10.1007%2F978-3-319-55084-8>

Problem 1: Tu, problem 31.2

Problem 2: Tu, Problem 31.3

Problem 3: Give a proof of Theorem 31.19 in Tu. Note, there is a proof already there, you can follow it and rewrite in your own words, or find a simpler one.

Problem 4: Apply Theorem 31.19 of Tu to the special case of a connection ω on a $G = SU(2)$ bundle, with associated vector bundle determined by the defining representation on \mathbf{C}^2 (i.e. give a formula for the covariant derivative). Find a formula for the square of the covariant derivative.