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 \( \omega \) on a \( G = SU(2) \) bundle, with associated vector bundle determined by the defining representation on \( \mathbb{C}^2 \) (i.e. give a formula for the covariant derivative). Find a formula for the square of the covariant derivative.