Problems are typically taken from either Jeffrey Lee's text *Manifolds and Differential Geometry* (MDG) or John Lee's text *Smooth Manifolds* (SM). I've also written a few problems. 5pts per problem here.

Problem 16 Let M be a manifold and (x, U) a chart. Prove U is diffeomorphic to $x(U)$.

Problem 17 Show the chain-rule on a manifold is implied by the chain-rule for smooth maps from $\mathbb{R}^n$ to $\mathbb{R}^m$.

Problem 18 SM Problem 2-3, page 48.

Problem 19 SM Problem 2-4, page 48.

Problem 20 SM Exercise 3.5, page 54.

Problem 21 SM Exercise 3.7, page 56

Problem 22 SM Exercise 3.17, page 65

Problem 23 SM Problem 3-2, page 75

Problem 24 SM Problem 3-4, page 75

Problem 25 SM Problem 3-6, page 75

Problem 26 Explain the four different views of the tangent space to M and state the isomorphisms between them (you don't have to prove they're actually isomorphisms, nor do you have to state all possible isomorphisms, I'm just looking for 4 objects and 3 connecting isomorphisms)