Read sections 2.1 and 2.2 of Bär’s “Elementary Differential Geometry.”

Solve the following problems:

1. Prove that the composition of two reparameterizations is a reparameterization.

2. Prove that for any parameterized curve $c : [a, b] \to \mathbb{R}^n$ and any Euclidean motion $F : \mathbb{R}^n \to \mathbb{R}^n$ the curves $c$ and $F \circ c$ have the same length.

3. For the following two curves write down explicit orientation-preserving reparameterization by arc-length. Be sure to specify the domain of the new parameterization:
   
   1. $c : [0, 2\pi] \to \mathbb{R}^2$, $c(t) = (3 \cos t, 3 \sin t)$.
   
   2. $\sigma : (0, \infty) \to \mathbb{R}^2$, $\sigma(t) = (t^2, t^3)$.

4. Bär, exercise 2.2 (page 28).