The question of how to measure similarity between curves in various topological spaces has received much attention recently. Possibilities for comparing curves include the Frechet distance (and its variants such as geodesic, homotopic, and isotopic Frechet distance), homotopy height, and deformation area (or the area of the homotopy); many of these have algorithms in settings that range from the plane to combinatorial surfaces to cell complexes. We will compare and survey known results as well as recent progress and open questions in several of these settings.