Subduction zones exhibit a wide range of plate interface angles, slab dip angles, topographic signatures and styles of penetration of the lower mantle. We have modeled subduction zones in two dimensions, as two distinct plates which are initially separated by a fault zone and underlain by the mantle. Subduction initiates in the model via frictional sliding within the fault zone whereby the slip is driven by negative buoyancy. A three-layered lithospheric model is chosen to represent the regions dominated by particular deformation processes in the lithosphere; brittle fracture in the upper-most part, brittle ductile transition in the core and dislocation creep for the lower-most part. The overriding plate lithosphere is varied in strength, thickness and density, to be representative of either oceanic or continental lithosphere with the continental lithosphere subdivided into either cratonic or mobile belt. The subducting plate is modeled as oceanic lithosphere. In both plates, the rheology of the top layer of the lithosphere is varied to determine which constitutive relationships result in earth-like subduction. In addition the angle of the plate interface, and consequently the slip plane, is varied to provide an analysis of the influence of the initial slip angle with regards to final topography, fault dip, slab dip and penetration of the lower mantle. We have found only certain parameter combinations and rheologies result in realistic, asymmetric, earth-like subduction. For example, using an anisotropic plasticity in the upper-most portion of the lithosphere is essential to obtain subduction similar to what is observed on Earth.