Topological insulators (TI’s) are materials that are insulators in their interiors, but have unique conducting states on their surfaces. They have attracted significant interest as fundamentally new electronic phases having potential applications from dissipationless interconnects to quantum computing. In particular, coupling the surface state of a TI to an s-wave superconductor is predicted to produce the long-sought Majorana quasiparticle excitations, which could play a role in solid-state implementations of a quantum computer. A requisite step in the search for Majorana fermions is to understand the nature and origin of the supercurrent generated between superconducting contacts and a TI. In this talk, I will discuss TI-superconductor junctions, focusing on transport measurements taken as the chemical potential is moved from the bulk bands into the band gap, or through the true topological regime characterized by the presence of only surface currents.