Nested loops are a fundamental structures found in many programming languages. But did you know they can offer a novel and effective introduction to some of the most basic combinatorial objects, like permutations and combinations? Indeed, teachers of discrete mathematics are likely familiar with the classic 2x2 grid of counting formulas enumerating selections (with/without) repetition and where order (does/does not) matter. However, recent research (Lockwood & De Chenne, in press) indicates that students can leverage their understanding of simple python code to reason coherently about each of these four central cases, and their work suggests there may be pedagogical merit in the incorporation of such a computational approach. In this talk, we explore several possible extensions of their ideas to Stirling numbers, set partitions, and a number of other related concepts. (Received September 18, 2019)