In this exercise, we investigate the placement of VLSI and PCB. The focus is on the formulation.

1. Identify/devise a softmax function with the following properties. Demonstrate/prove your claimed properties.
   1.1. The function is convex and numerically practical with a double floating point presentation.
   1.2. The function has the minimal worst error compared with published formulations.
   1.3. The function has the least average error compared with published formulations.

2. Formulate a VLSI mixed mode placement with the following properties. Demonstrate/prove your claimed properties.
   2.1. The formulation handles global and local placement density constraints.
   2.2. The formulation handles hundreds of huge-sized block cells as well as millions of tiny standard cells.
   2.3. The formulation handles timing constraints.

3. Formulate a PCB placement problem with the following properties. Demonstrate/prove your claimed properties.
   3.1. The formulation minimizes the net crossings.
   3.2. The formulation allows two-sided placement.
   3.3. The formulation handles capacitors for power noise decoupling and terminators for impedance matching.