6.896 BRAINTEASER #2
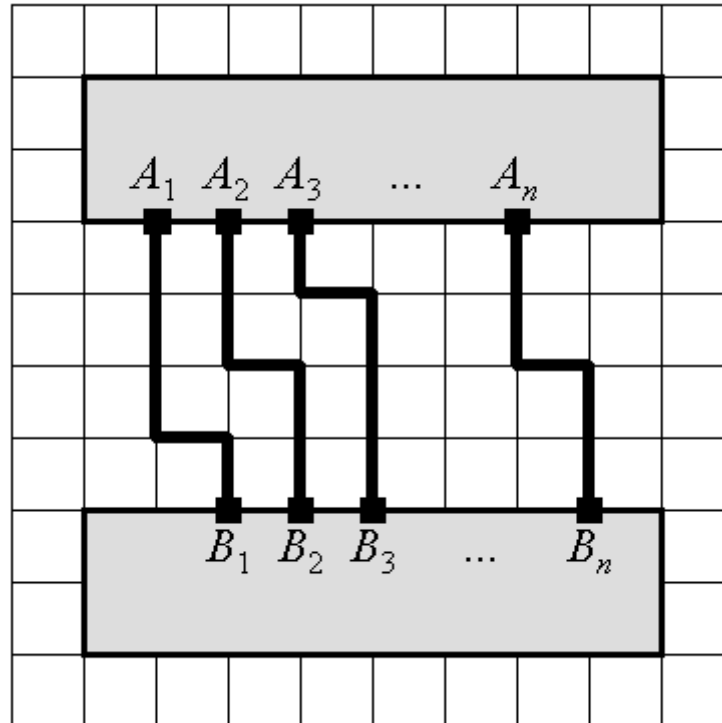

Figure 1

Figure 1 shows a single-layer circuit board containing two modules A and B, each of which has n connecting points, or *pins*. Each pin on module A must be connected to the corresponding pin on module B using a wire. Wires must run along the underlying grid, but no two wires may use the same grid point or segment. The modules can move vertically (up and down), but not horizontally (left or right). Since the two modules are offset horizontally (pin B_1 is directly below pin A_2, pin B_2 is below pin A_3, etc.), the routing problem is impossible if the modules are placed too close together vertically. What is the minimum vertical separation that can be obtained between A and B so that all n wires can be routed?