1. Prove: for 3x3 Hex, each dotted cell below is a losing black opening move. Hint: mustplay.

2. Recall: for a player, a position, and two given points, a virtual connection is a second-player strategy for that player that joins the two points. Prove or disprove: the pairing strategy below (whenever the opponent plays at a cell, reply at the other cell with the same label) is a black virtual connection from b3 to the top.

3. Recall: for a Hex position, an empty cell is live if it is in a set $S$ of empty cells satisfying these two properties:
   a) $S$ joins a player’s _________________________________
   b) no proper subset of $S$ satisfies a).

   An empty cell is dead if it is not live.

   A colored cell is dead if, after uncoloring that cell, that empty cell is dead.

   In the position below b3 is live, because the set $S = ______________________$ joins the two white sides and is minimal with this property.

   Recall: for a Hex position and a player $X$, a set $S$ of cells is $X$-captured if $X$ has a second-player strategy that leaves every cell of $S$ dead or $X$’s. For the position below, explain why $\{b3, c3\}$ is black-captured.