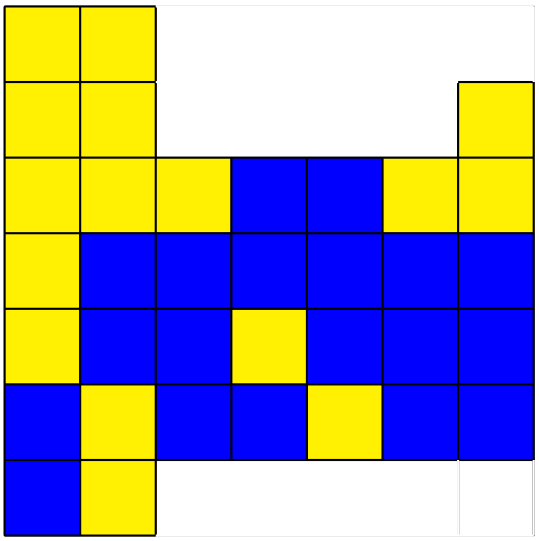
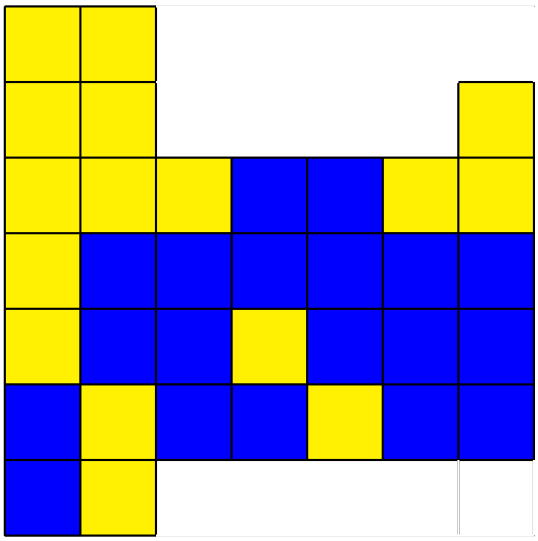
Quiz 3A, Math of Democracy

Fall 2018, Dr. Adam Graham-Squire

Name: _____

1. Consider the following Squaretopia, with blocks colored in for the Yellow and Blue parties. I have made the diagram twice in case you need an extra copy. Suppose you need to make 5 districts of equal size.





   (a) What is the theoretical maximum number districts you could make for the Blue party? For the Yellow party? Explain/show your calculations.

   (b) Choose one of the parties (Blue or Yellow) and draw 5 districts that will most favor that party. Explain (briefly) how you made your districts. It is recommended that you start using pencil, but you should make a final draft with clear, thick lines for me to grade.

2. Choose two of the districts that you made in question 1, one district that you believe to be the MOST compact and one district that you believe to be the LEAST compact.

   For each of those two districts, calculate the Isoperimetric (square Polsby-Popper) score. Does the Isoperimetric compactness score seem to accurately capture the comparative compactness of the two districts? Explain why or why not. (Note: **Isoperimetric (Square Polsby-Popper) measure:** $16A/P^2$, where A is the district's area and P is its perimeter.)