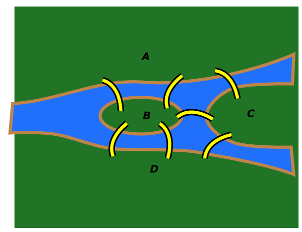
BRIDGES OF KONIGSBERG.

During the class we talked about the bridges of Königsberg. We found that the key to answering this kind of problems lies in counting the number of islands with odd number of bridges — or, if you replace each island by a point and each bridge by an arc, the number of points which have an odd number of arcs coming into them. If there are at most two such points, the problem can be solved; if more than two, it can not be solved.

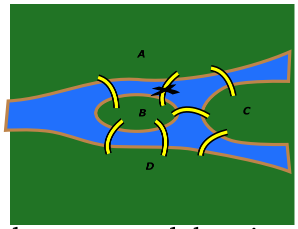
CLASSWORK



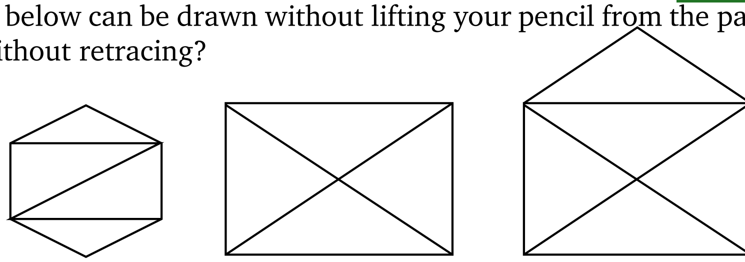
1. The figure to the right shows a map of a city with islands and bridges. Is it possible to complete a walk in this city so that you walk on each of the seven bridges exactly once? (You may start anywhere you like, and you do not have to come back to the starting point.)

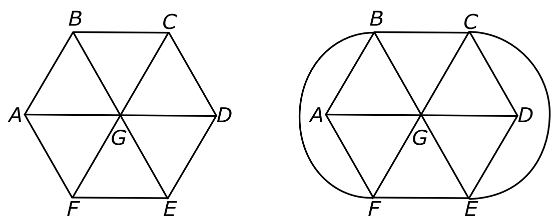
Homework

1. Once, flood destroyed one of the bridges between river bank A and island B; the new map (with the destroyed bridge crossed out) is shown here. Is it now possible to complete a walk in this city so that you walk on each of the seven bridges exactly once?

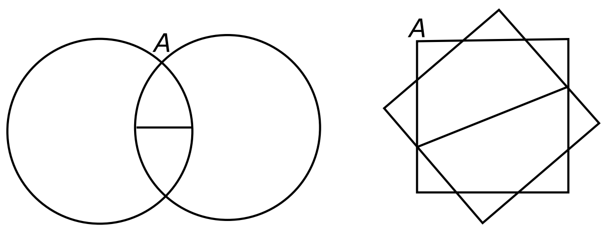


2. Which of the figures below can be drawn without lifting your pencil from the paper and drawing very line exactly once, without retracing?

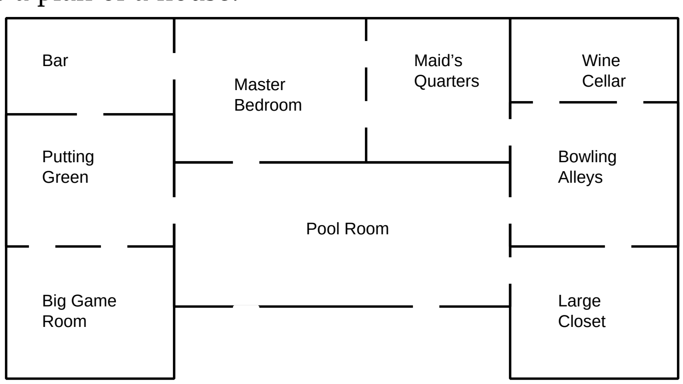




3. Which of the figures below can be drawn without lifting your pencil from the paper **starting at point** A and drawing very line exactly once, without retracing? What if you start at some other point?



4. The figure below shows a plan of a house.



Is it possible to enter this house, walk through it going through every door exactly once, and then exit again through the other door? If not, could it be done if you are allowed to miss one door, not going through it? [Hint: it may be easier if instead of this picture, you make a new one, replacing each room (and also the outside of the house) by a point, and drawing a line connecting two points for every door.]