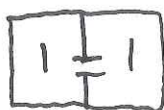
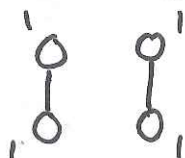
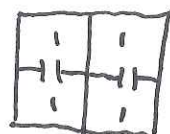


The **degree** of a room is how many doors it has. We consider the outside of the floorplan to be a room (at least if it has any doors to it). The degree of a vertex is how many edges it has. We found that a complete tour through the house gets stuck at rooms with an odd degree. A complete tracing gets stuck at vertices with an odd degree. Let's try to make our own floorplans or vertex-edge graphs where the degrees of the rooms or vertices are given: Draw a floor plan (or vertex-edge graph) with two rooms, each with degree 1.



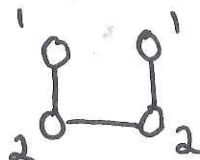
$$\frac{1+1=2}{2} = 1 \text{ door}$$

Draw a floor plan with four rooms, each with degree 1.



$$\frac{1+1+1+1=4}{2} = 2 \text{ doors}$$

Draw a floor plan with four rooms, two of degree 1, two of degree 2.



$$\frac{1+1+2+2=6}{2} = 3 \text{ doors}$$

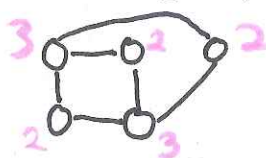
Draw a floor plan with three rooms, each with degree 1. Remember the outside counts as a room.



$$\frac{1+1+1=3}{2} = 1.5 \text{ doors}$$

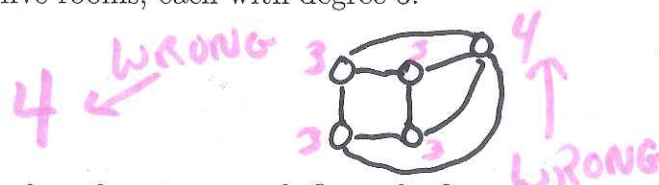
Impossible

Draw a floor plan with five rooms, two with degree 3, the rest with degree 2.



$$\frac{3+3+2+2+2=12}{2} = 6 \text{ doors}$$

Draw a floor plan with five rooms, each with degree 3.



$$\frac{3+3+3+3+3=15}{2} = 7.5 \text{ Doors}$$

Impossible

Can you give a rule for when there is no such floor plan?

The sum of the degrees must be even,
other wise a door leads nowhere.

The sum of degrees counts each side of a door,
so is double the number of doors.

Garbage truck: How should the garbage truck go through the neighborhood? It is an “automatic side loader” garbage truck with a giant claw on the right hand side, so it can empty all the garbage cans on the right hand side of the street as it goes by. Of course, if it goes the same way on the same street twice, the garbage is already done, and it is wasting its time.

Can you find a route through these neighborhoods that drives along each side of each stretch of road exactly once? What is the fewest number of U-turns?

