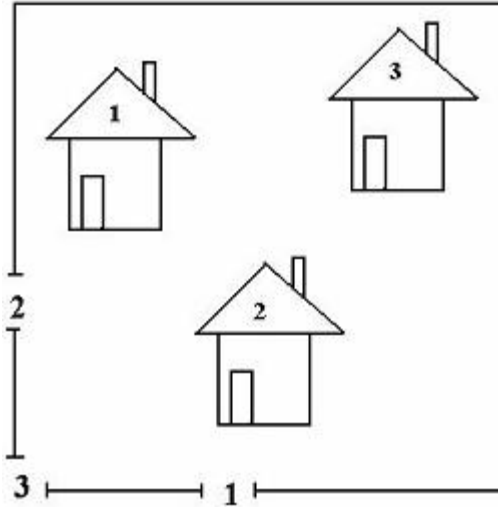
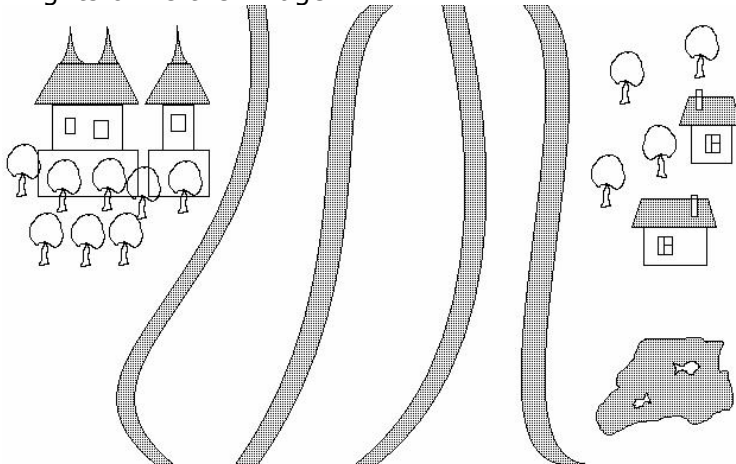


Problems for October 31, 2009

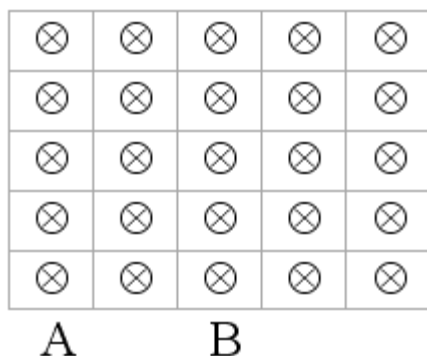
1. A square field has three houses on it (see the picture). It is surrounded by a fence which has three gates. Draw a path from each of the houses to the gate with the same number, in such a way that your paths do not intersect.



2. Two Noble Knights, called A and B, own some land next to each other. A very curving stream separates their dominions. A fragment of a map below shows the castle of the Noble Knight A, a village and a part of the stream. Which of the two knights owns the village?



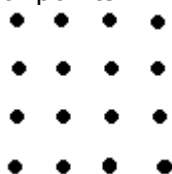
3. Someone is connecting a set of Christmas lights (see the picture) with pieces of electric wire. Two adjacent lights can be connected by a horizontal or vertical piece of wire. The wire should start at A and end at B (no branching allowed). Give an example of how this could be done.



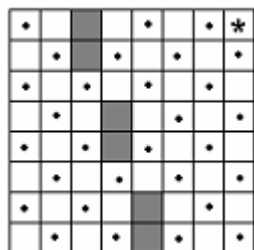
4. The picture below shows seven squares, 3 black checkers and 3 white checkers. One is asked to move the black checkers to the squares occupied by white checkers and the other way around, following some rules. The rules say that a checker can be moved to an unoccupied adjacent square, or it can jump over an adjacent checker if the square on the other side of it is unoccupied. Give an example

1	2	3	4	5	6	7
●	●	●		○	○	○

5. Remove several dots on the picture in such a way that no four of the remaining dots are vertices of a square. Try to achieve this by removing the least possible number of points.

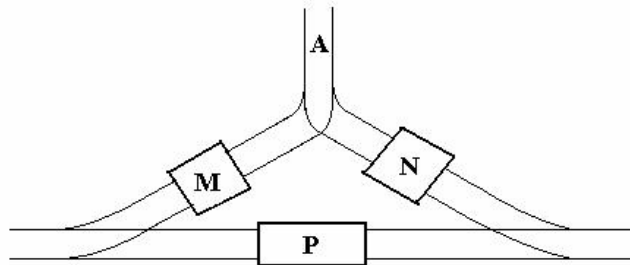


6. The picture below is a plan of an apple grove (each dot denotes an apple tree). The gardener picked apples from all of the trees. He had started from the square marked with a star and walked through every unshaded square (either with an apple tree in it or empty). He never returned to the same square again, never walked across the diagonal and never visited the shaded squares (since they had some buildings on them). In the end, the gardener came back to square he started from. Draw his path.



7. A boy has drawn three straight lines and marked 6 points on them. It so happened that each of the lines had 3 marked points. Show how he did it.

1. A railroad engine marked with P stands on the main track. Two rail cars marked M and N stand on the short side tracks as shown below. The part of the track marked with A is only long enough for a single rail car, but not for the engine. The task is to swap the two cars (i.e. move N to the left side track and M to the right side track).



2. On a pitch dark Halloween night a family came to a bridge. The Father can cross the bridge in 1 minute, the Mother - in 2 minutes, their toddler Son in 5 minutes and the Grandmother in 10 minutes. They only have one flash light and the bridge can only hold at most two people (otherwise it falls into the river). How can the family cross the bridge in 17 minutes to escape a band of ghosts (which are not allowed to cross the bridge)? If two people are walking over the bridge they move at the speed of the slower of them. You cannot walk over the bridge without the flash light. You cannot point the flash light from a distance. One person is not allowed to carry another. You cannot throw the flash light e.g. across the river.
3. Put 32 chess knights on the chess board in such a way that each knight will attack exactly two other knights.