Percolation and related topics II

Exercises will be taken mostly from my book *Probability on Graphs*, published by Cambridge University Press in 2010, and available online at

`http://www.statslab.cam.ac.uk/~grg/books/pgs.html`

Scripts to be handed in to lecturer (via his pigeon-hole) by **12 noon on Tuesday 23 April**. Class to be confirmed, but provisionally timetabled for Tuesday 30th April at 3pm in MR12. Please keep an eye on the course webpage for possible changes.

1. *A critical exponent inequality.* Exercise 5.1.
2. *Russo's formula.* Exercise 4.9.
3. Read the proof of the BK inequality in Section 4.3.
4. Read Section 4.5.
5. *Using sharp-threshold.* Exercise 4.11 (an example of influence in action).
6. *Word percolation.* Exercise 3.11.
7. *Power-law bounds.* Exercise 5.4.
8. *FKG for Ising model.* Exercise 7.3.
9. *Lorentz mirror problem.* A small double-sided plane mirror is centred at each vertex of the square lattice. There are two possible states of a mirror, namely inclined either SW/NE or SE/NW. The inclination at a given vertex is given according to the toss of a fair coin, and different vertices have independently inclined mirrors.

   Light is shone northwards from the origin. Show that the probability θ, that the light-ray is unbounded, satisfies $\theta = 0$.
10. *Profit from the vacation!*