Percolation and related topics I

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

$$\texttt{http://www.statslab.cam.ac.uk/}{\sim}\texttt{grg/books/pgs.html}$$

This set of exercises is extracted from the ends of Chapters 3, 4, and 5.

Handout for 21 October. Scripts to be handed in to lecturer (or via pigeon-hole)
by **12 noon on 28 October**. Class to be arranged.

1. *Subadditive inequalities.* Exercises 3.1 and 3.2.

2. *Bond and site critical probabilities.* Exercise 3.3. Do you have an idea for the last
   part?

3. *Covering graphs.* Exercise 3.4.

4. *The problem of runs.* Exercises 3.7 and 3.8. Do not worry overmuch about the
   fact that you need to work with integer-values. This is 'just noise'.

5. Exercise 3.9. This is the open problem that I omitted to mention the other day.
   You will need to know that $\theta(\frac{1}{2}) = 0$ for bond percolation on the square lattice.

6. Exercise 3.10, suggested by a French colleague.

7. *Positive-correlation for product measures.* Exercises 4.2 and 4.3.

8. *Equivalence of FKG condition and monotonicity.* Exercise 4.5.

9. *A critical-exponent inequality.* Exercise 5.1.

10. *Optional preparation for Cardy's formula.* Exercise 5.7.