Math 6502 : HW # 1

All book problems are from Alon & Spencer, 4th edition.

(*) = required, (**) = optional, (***) = very optional / research problem

1. (*) Chapter 1. Problem 1.
2. (*) Chapter 1. Problem 10.
3. (**) Chapter 1. Problem 5.
4. (***+)
   (a) Prove that there exists an $\epsilon > 0$, not depending on k, such that
   $$R(k,k) \geq \left(\sqrt{2}+\epsilon\right)^k$$
   for all sufficiently large k.
   (b) Prove that exists an $\epsilon > 0$, not depending on k, such that
   $$R(k,k) \geq (4-\epsilon)^k$$
   for all sufficiently large k.
   (c) Prove that
   $$\lim_{k\to\infty} R(k,k)^{1/k}$$
   exists. (Or prove that the limit does not exist!)