

COMP 550, Spring 2015

Assignment 3

DUE: 9:05 Feb 11, 2015

1) (20') When tossing a fair coin, the probability of head or tail is the same (50%).

(a) A fair coin is tossed until a head comes up for the first time. What's the probability of this happening on (ending after) an odd number toss?

(b) You apply the following rules to a fair coin: In the first round, you flip it. Starting from the second round, (i) if it's a "head" after the previous round, just simply turn it upside down (a "head" is guaranteed to become a "tail" in the next round); (ii) if it's a "tail" after the previous round, toss it again for once (50-50 for being either head or tail). What is the expected probability of the coin being "head" after round K , where K is a sufficiently large number?

(Hint: $K=1$, $p_H=0.5$; $K=2$, $p_H=0.25$; $K=3$, $p_H=0.375$;...; $k \rightarrow \infty$, $p_H = ?$)

When K is sufficiently large, the expected probability of the coin being "head" should be *stable*; i.e., p_H remains unchanged.)

2) (12') CLRS Exercise 5.2-4 on page 122

3) (12') CLRS Exercise 5.2-5 on page 122

4) (28') CLRS 7-5 on page 188

5) (28') CLRS 7-2 on page 186

Rules for ALL HWs (in addition to the statements in the syllabus):

You are encouraged to discuss the problem sets and study together in group, but when it comes to formulating/writing solutions you must work alone independently; i.e., you should be able to explain your answer clearly to anyone else. Note that this says discuss in group — copying homework solutions from another student, from the Internet, solution sets of friends who have taken this course or one similar to it previously, or other sources will be considered **cheating** and referred to the student attorney general. *You must include a signed honor statement with each submission explicitly listing the people you worked with and stating that you completed the assignment in accordance with these rules.*