

3. You are walking towards your favorite tree and start out one mile away. You move closer by first rolling a six-sided die to obtain the number D_i . You then cover a $1 - \frac{D_i}{10}$ fraction of the distance remaining between you and the tree. So if you roll a 3 on your first roll you would move to be .3 miles from the tree. If you then roll a 6 you would move to $.3 * .6$ miles away from the tree, and so on.
- (a) Write an expression for your distance, S_n , to the tree after n steps.
- (b) What is ES_n ?
- (c) What is $E \ln(D_1/10)$?
- (d) Explain why the law of large numbers guarantees $\ln S_n \approx nE \ln(D_1/10)$.
- (e) What does $e^{\ln S_n}$ converge to?
- (f) There is a conflict between (b) and (e). Why are they different, and which answer actually predicts how close you will be to the tree after n steps?

Answers to Homework 3

5. 5.03
6. The right answer when $n = 100$ and $m = 10$ is 90.226. I don't want to give away the general formula.
10. $(3.5)^2$, 79.965
16. 0, no
20. .1111, .0013 (w/o histogram) .0021 (w/ histogram correction) You should use a histogram correction.
22. .079, .0287
26. 0.177
31. .1056
34. .3085, .2709
37. 157
46. .359
49. $.04 \pm 2\sqrt{(.04)(.96)/625}$ so [.024, .056].
59. ≥ 23