# STA 256f18 Assignment Three[1]

Please read Sections 1.5-1.7 (pages 16-26) in the text, and look over your lecture notes. These homework problems are not to be handed in. They are preparation for Term Test 1 and the final exam. All textbook problems are from Chapter One.

1. Do Problem 45 in the text.
2. Do Problem 46 in the text.
3. Do Problem 47 in the text.
4. Do Problem 53 in the text.
5. I die is a cube with 1, 2, 3, 4, 5 or 6 dots on each face. Roll two fair dice.
   (a) What is the probability that the two numbers are different?
   (b) What is the probability that the sum is even?
6. Do Problem 58 in the text. This is one version of a classic problem, and the reason it's a classic is that it's so easy to get mixed up. Use the definition of conditional probability. What is the probability of Drew given that the teacher says "Chris?".
7. Do Problem 59 in the text.
8. Do Problem 60 in the text.
9. Do Problem 62 in the text.
10. Do Problem 63 in the text.
11. Do Problem 64 in the text.
12. Do Problem 65 in the text.
13. Do Problem 68 in the text.
14. Do Problem 69 in the text.
15. Do Problem 70 in the text.
16. Do Problem 72 in the text.
17. Do Problem 74 in the text.
18. Do Problem 77 in the text.

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19. Roll a single fair die repeatedly.

    (a) What is the probability that the first 6 appears on the 4th roll?

    (b) What is the probability that a 6 eventually occurs – that is, on roll 1 or 2 or ...? Show your work.

    (c) What is the probability that the first 6 occurs on an odd numbered roll?

20. A jar contains 10 red balls and 20 blue balls. If you sample 5 balls randomly *with* replacement, what is the probability of

    (a) All blue?

    (b) At least one red?

    (c) Two red and three blue?

    (d) Obtaining $j$ red balls, $j = 0, \ldots, 5$? Give a single formula. Don't simplify.

21. Let $\Omega = \cup_{k=1}^{\infty} B_k$, disjoint, with $P(B_k) > 0$ for all $k$.

    (a) Using the formula sheet and the tabular format illustrated in lecture, prove the Law of Total Probability: $P(A) = \sum_{k=1}^{\infty} P(A|B_k)P(B_k)$.

    (b) Prove the following version of Bayes' Theorem: $P(B_j|A) = \frac{P(A|B_j)P(B_j)}{\sum_{k=1}^{\infty} P(A|B_k)P(B_k)}$. You may use anything from the formula sheet except Bayes' theorem itself.

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