

ENEE324-03. Problem set 3

Date due March 3, 2015

1. Let x be a random point selected from the interval $(0, 1)$ with uniform distribution. Five random points have been selected independently of each other. What is the probability that at least two of them are less than $1/4$?
2. A rare mutation is found in 0.05% of tulips. On a recent trip to Holland I cut 3000 random tulips. Use the Poisson approximation to compute the probability that at most 2 of them carry this mutation.
3. A random digit is a digit chosen from the set $\{0, 1, 2, \dots, 9\}$ with uniform distribution. Of course, $P(d = 6) = 0.1$ for any single choice. I claim that after choosing n random independent digits, the probability that one or more of them are 6, is ≥ 0.9 . What is the smallest possible n ?
4. Player 1 tossed a fair coin n times, then Player 2 tossed a fair coin n times. What is the probability that both got the same number of Heads?
5. A communication device transmits data of types A, B, and C. One transmission includes data of only one type. Over a long range of time, 30% of transmissions contained type-A data, 50% of transmissions contained type-B data, and 20% of transmissions contained type-C data. The data was received successfully by the receiving party in 80%, 70%, and 64% of transmissions for type A, B, and C, respectively. You are told that one transmission has failed. What is the probability that it carried data of type C?
6. In my purse I have 10 circular coins of radius 1, 2, 3, ..., 10, respectively. A pickpocket lifted my wallet (argh-h!) and fetched a random coin. What is the expected area of the coin?
7. Keep tossing a fair coin till you get at least one H and at least one T. What is the expected number of tosses?