

This homework is due by 5pm on Thursday Feb 22th. Please hand it to the CS174 homework box on the second floor of Soda Hall.

1. Let G be a random graph with n vertices and m edges generated using the first random graph algorithm from lecture 9. How large should m be to have high probability (say 0.99) that the graph has \sqrt{n} or fewer connected pieces?
2. Suppose a fair 6-sided die is tossed once. Let X be a random variable which is 1 if the number on the die is even, 0 otherwise. Let Y be a variable which is 1 if the number on the die is 4 or greater. Compute:
 - (a) The Covariance $\text{Cov}(X, Y)$ of X and Y .
 - (b) Compute the Variance $\text{Var}(X + Y)$ of the sum of X and Y using (a).
3. Let G be a random graph generated using the second algorithm from lecture 9. What is the threshold probability for a 5-clique in the graph?
4. Give Markov, Chebyshev and Chernoff bounds for the following problem: A fair die is tossed 1000 times. The expected value of the sum of the numbers is 3500. What is the probability that the sum is greater than 5000?