CSE 525: Randomized Algorithms and Probability **Spring 2026**

HW6

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Instructions

- You should think about each problem by yourself for at least an hour before choosing to collaborate with others.
- You are allowed to collaborate with fellow students taking the class in solving the problems. But you **must** write your solution on your own.
- You are not allowed to search for answers or hints on the web. You are encouraged to contact the instructor or the TAs for a possible hint.
- You cannot collaborate on Extra credit problems
- Solutions typeset in LATEX are preferred.
- Feel free to use the Discussion Board or email the instructor or the TAs if you have any questions or would like any clarifications about the problems.
- Please upload your solutions to Gradescope.

In solving these assignments, feel free to use these approximations:

$$1 - x \approx e^{-x}, \qquad \sqrt{1-x} \approx 1 - x/2, \qquad n! \approx (n/e)^n, \qquad \left(\frac{n}{k}\right)^k \leq \binom{n}{k} \leq \left(\frac{en}{k}\right)^k$$

1. Show that the cover time of any unweighted d-regular graph $G = (V, E)$ is $O(n^2 \log n)$.

   Hint: What is the length of the shortest path between $u, v \in V$?

2. Let $A \in \mathbb{R}^{n \times n}$ be a random Gaussian matrix where every entry $A_{i,j}$ is distributed as a $\mathcal{N}(0, 1)$ and $A_{i,j} = A_{j,i}$, and $A_{i,i} = 0$ for all $1 \leq i < j \leq n$. Prove that $\lambda_{\max}(A) \leq O(\sqrt{n})$ with high probability.