Problem Set 2
CPSC 689 Randomized Algorithms
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The assignment is due Monday, Feb 8, before class.

Problem 1. Exercise 2.9 on page 39 in our textbook.

Problem 2. Let $\Omega = S_n$ be the set of permutations on $n$ elements. The $\sigma$-algebra $\mathcal{F} = P(\Omega)$, and $\Pr$ is the uniform probability measure on $\mathcal{F}$, meaning that for each permutation $\pi \in \Omega$, we have $\Pr[\{\pi\}] = 1/n!$. Let $X$ be the random variable $X : \mathcal{F} \rightarrow \mathbb{R}$ such that for each $\pi \in \Omega$, the value $X(\pi)$ is defined to be the number of fix points of the permutation $\pi$. Calculate the expected number of fixed points $E[X]$. [Hint: Decompose $X$ into a sum of simpler random variables.]

Problem 3. Exercise 3.8 on page 58 of our textbook.

Problem 4. Exercise 3.22 (a)-(e) on page 60 of our textbook.

Problem 5. Exercise 3.25 on page 60 of our textbook.

Please typeset your solution in \LaTeX{} or write very neatly!