Exam Scores: Suppose a class of students gets an average score of 60% on a test. Find an upper bound on the probability that a randomly-chosen student’s score is 72% or higher.

Card Draws: Suppose you randomly draw a card from a deck of cards (with replacement) until you draw the ace of spades. Find an upper bound on the probability that it takes $\geq 100$ draws to draw the ace of spades.

CS Salaries: Suppose the average salary of a new CS grad is $64k per year and the standard deviation is $10k. Bound the probability that a new CS grad makes a salary that deviates from the average by more than $20k.
Coin Flips: Suppose you estimate the probability that a biased coin comes up heads using the fraction of times it comes up heads out of 100 trials. Assume the coin is biased and the true probability that it comes up heads is $p$. Bound the probability that the estimated probability $\hat{p}$ of coming up heads deviates from the true probability $p$ by more than 0.2.

Exam Scores Revisited: Suppose a class of students gets an average score of 60% on a test. The maximum score a student can get is 100%. Find an upper bound on the probability that a randomly-chosen student’s score is 20% or lower.

CS Salaries Revisited: Suppose the average salary of a new CS grad is $64k per year and the standard deviation is $10k. Find an upper bound on the probability that a new CS grad makes at least $80k per year using Markov’s inequality. Then try to use Chebyshev’s inequality to find a tighter upper bound for that probability.