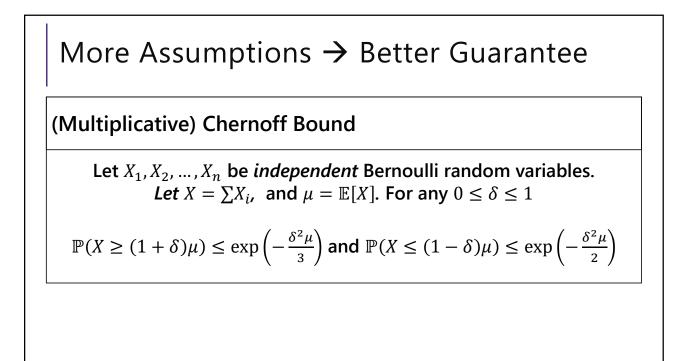
Near the mean

Suppose you run a poll of **1000** people where in the true population 60% of the population supports you. What is the probability that the poll is not within 10-percentage-points of the true value?

 $\bar{X} = \sum X_i / 1000$ $\mathbb{E}[\bar{X}]$ $Var(\bar{X})$

Chebyshev's InequalityLet X be a random variable. For
any t > 0 $\mathbb{P}(|X - \mathbb{E}[X]| \ge t) \le \frac{\operatorname{Var}(X)}{t^2}$



Left Tail

Suppose you run a poll of **1000** people where in the true population 60% of the population supports you. What is the probability that the poll is not within 10-percentage-points of the true value?

Want
$$\mathbb{P}\left(\frac{X}{1000} \leq .5\right) = \mathbb{P}(X \leq .5 \cdot 1000)$$

Chernoff Bound (left tail) Let $X_1, X_2, ..., X_n$ be *independent* Bernoulli random variables. Let $X = \sum X_i$, and $\mu = \mathbb{E}[X]$. For any $0 \le \delta \le 1$ $\mathbb{P}(X \le (1 - \delta)\mu) \le \exp\left(-\frac{\delta^2\mu}{2}\right)$

