Approximating a continuous distribution

You buy lightbulbs that burn out according to an exponential distribution with parameter of $\lambda = 1.8$ lightbulbs per year.

You buy a 10 pack of (independent) light bulbs. What is the probability that your 10-pack lasts at least 5 years?

Let X_i be the time it takes for lightbulb i to burn out.

Let X be the total time. Estimate $\mathbb{P}(X \geq 5)$.

1

Polling

Let X_i be the indicator for "person i in the sample supports you."

$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{30}$ is the fraction who support you.

We're interested in the event $\mathbb{P}(\bar{X} \leq .5)$.

What is $\mathbb{E}[\bar{X}]$? What is $\mathrm{Var}(\bar{X})$?

2

Poll Setup

Let X_i be the indicator that the i^{th} person you interview supports the proposal.

Your random variable is $\hat{p}$: $\sum X_i/n$

Let p be the true fraction of people who support the proposal.

What is the

$\mathbb{E}[\hat{p}] =$

$\text{Var}(\hat{p}) =$

3

Different dice

Roll two fair dice independently. Let U be the minimum of the two rolls and V be the maximum

Are U and V independent?

Write the joint distribution in the table

What's $p_U(z)$? (the marginal for U)

$p_{U,V}$	U=1	U=2	U=3	U=4
V=1				
V=2				
V=3				
V=4				

4