A population of UOCDs is being generated by random distribution with unknown params.

5. Generate random uniform vars $X_e$ in range $[L, 1 + L]$. We know it's uniform but don't know $L, 1 + L$. 
Observe \( 100 \times c \)
\[ \times \frac{1}{100} \]
Estimate \( L, H \).

Let \( L \)?

So \( L \): \( 3, 1, 2, 2, 0 \).

\( \sum 1 \) \( (7, 14) \)

Is range \( [3, 10] \) possible?

Good value then \( L = 1 \).

\( L \) cannot be \( > 1 \).

\( H = 20 \).
Commonsense guess

\[ L = M(\mu(x)) \]
\[ H = \max x(x) \]

Not best perhaps but pretty good -

Q1: What are unknown params?

Q2: Is my assured DISTN correct?

\[ x = 1, 5, 2, 1, 7, 3, 2, 1 \]

Perhaps not uniform.
Q3: GUESS THE PARAM. IS THIS GUESS REASONABLE?

Here is a particular way these questions are sometimes worded. This is for yes/no q.

Have a coin. Maybe it's fair. Maybe no. Toss it 100 times. If it is fair, what's probability of seeing this outcome? Please see 2604? Better outcome to analyse.
Run with this coin example, 

cut: toss 100 times, 

run observe: X = # Heaps. 

\[ E [X] = 50 = \mu \]

\[ \text{std}(X) = \sqrt{\text{var}} = \sqrt{\mu = 50} = 2.5 \]

\[ P(\mu - 5 < X < \mu + 5) \approx \frac{1}{2} \]

\[ P(45 < X < 55) \approx \frac{2}{3} \]

\[ P(X > 60) \]

\[ \mu + 2\sigma \]

\[ \mu + 3\sigma \]
If this coin is fair and we toss it 100 times, prob we'll see ≥ 60 heads is 2%

That's math.

Is it fair? That's policy.

"Coin is fair" [NULL HYPOTHESIS]

"Coin not fair" [ALTERNATIVE HYP]

You have freedom in selecting
ALTERNATIVE. I might have asked

if the heads is more than 10 off fair

either way:

\[ |x - 50| > 10 \] : ≥ 60

or ≤ 40
Have a coin with unknown $p$. Toss it $N$ times, see $X$ heads. Estimate $p$.

$$p = \frac{X}{N}$$

Is good. Is best.

We want ESTIMATOR FUNCTIONS for DISTRIBUTION.

So what is the parameter estimation?

Some estimators are better. What’s better?
Distribution is $N(\mu, \sigma^2)$

Gaussian unknown $\mu$

Sample 100 $X_i$

Want to estimate $\mu$ mean

choices for estimator function

C1. $\bar{X} = \frac{\sum X_i}{N}$

sample mean

C2: $\text{median}(X_i)$

C3: $\max(X_i) \& \min(X_i)$

$\sigma$

These estimators are random functions of population.

They have means $\sigma_0$ themselves.
The std measures how much the estimator jumps around with different samples.

\[ \text{Estimator whose own std is small is better.} \]

In this case mean is best.
But what if \( J \) is not Gaussian? The noise might be Poisson. strapped like this? Then maybe \( J \) might be better.