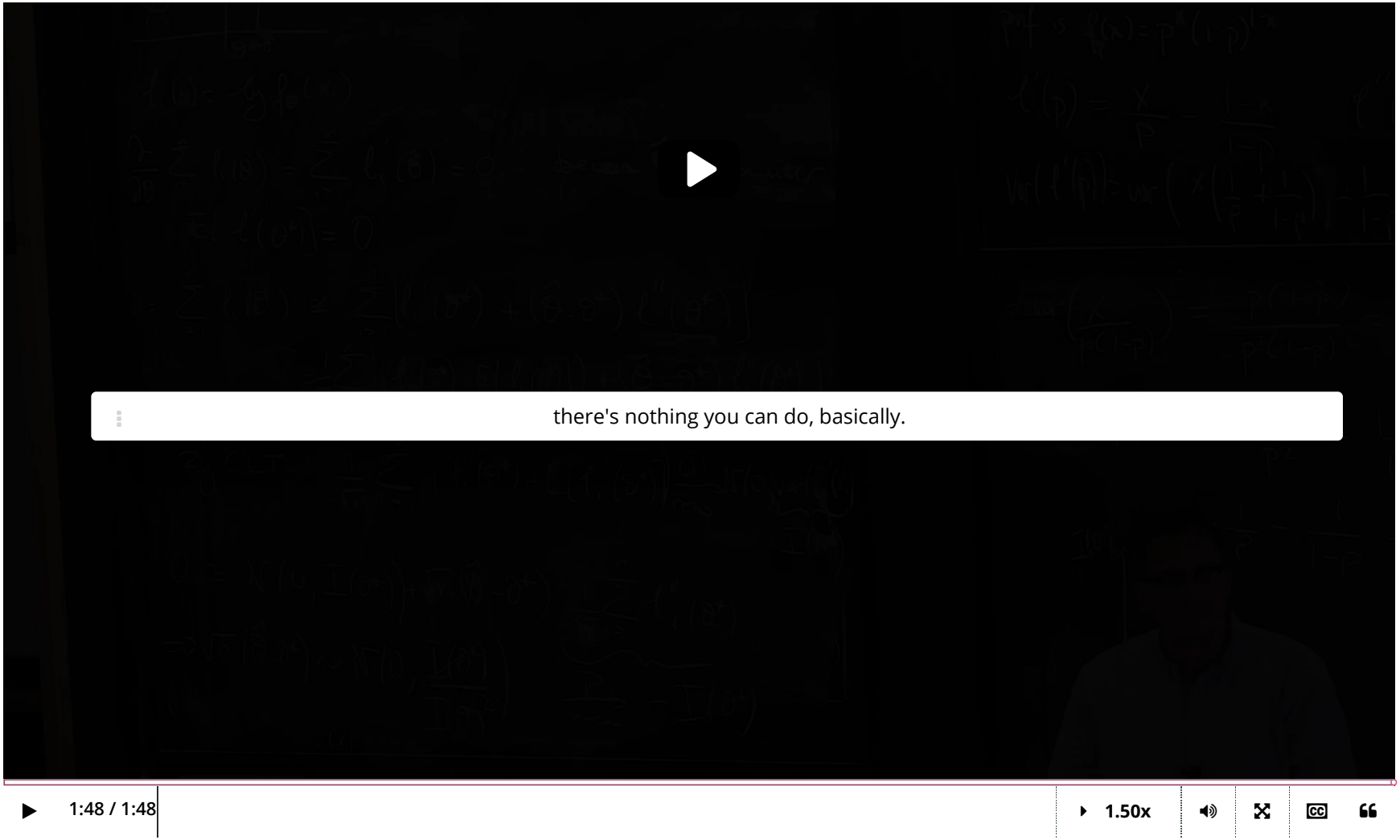
7. Introduction to Method of Moments
Concluding thoughts on Asymptotic Normality of MLE



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Estimating Moments

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Let $X_1, \ldots, X_n \overset{iid}{\sim} \mathbf{P}_{\theta^*}$ be integer-valued random variables and let $(\mathbb{Z}, \{\mathbf{P}_\theta\}_{\theta \in \Theta})$ be the associated statistical model. Let p_θ denote the pmf of $\mathbf{P}_\theta$. Assume that for all $\theta \in \Theta$, the **k-th moment**

$$m_k(\theta) := \mathbb{E}[X^k] = \sum_{x \in \mathbb{Z}} x^k p_\theta(x)$$

exists for all $k \geq 1$. Use the law of large numbers to fill in the formula so that $\widehat{m}_k(\theta)$ is a consistent estimator for $m_k(\theta)$.

(Type **X_i** for X_i.)

$\widehat{m}_K(\theta) = \frac{1}{n} \sum_{i=1}^{n}$ X_i^k ✔ **Answer:** X_i^k

X_i^k

STANDARD NOTATION

Solution:

The weak law of large numbers implies that

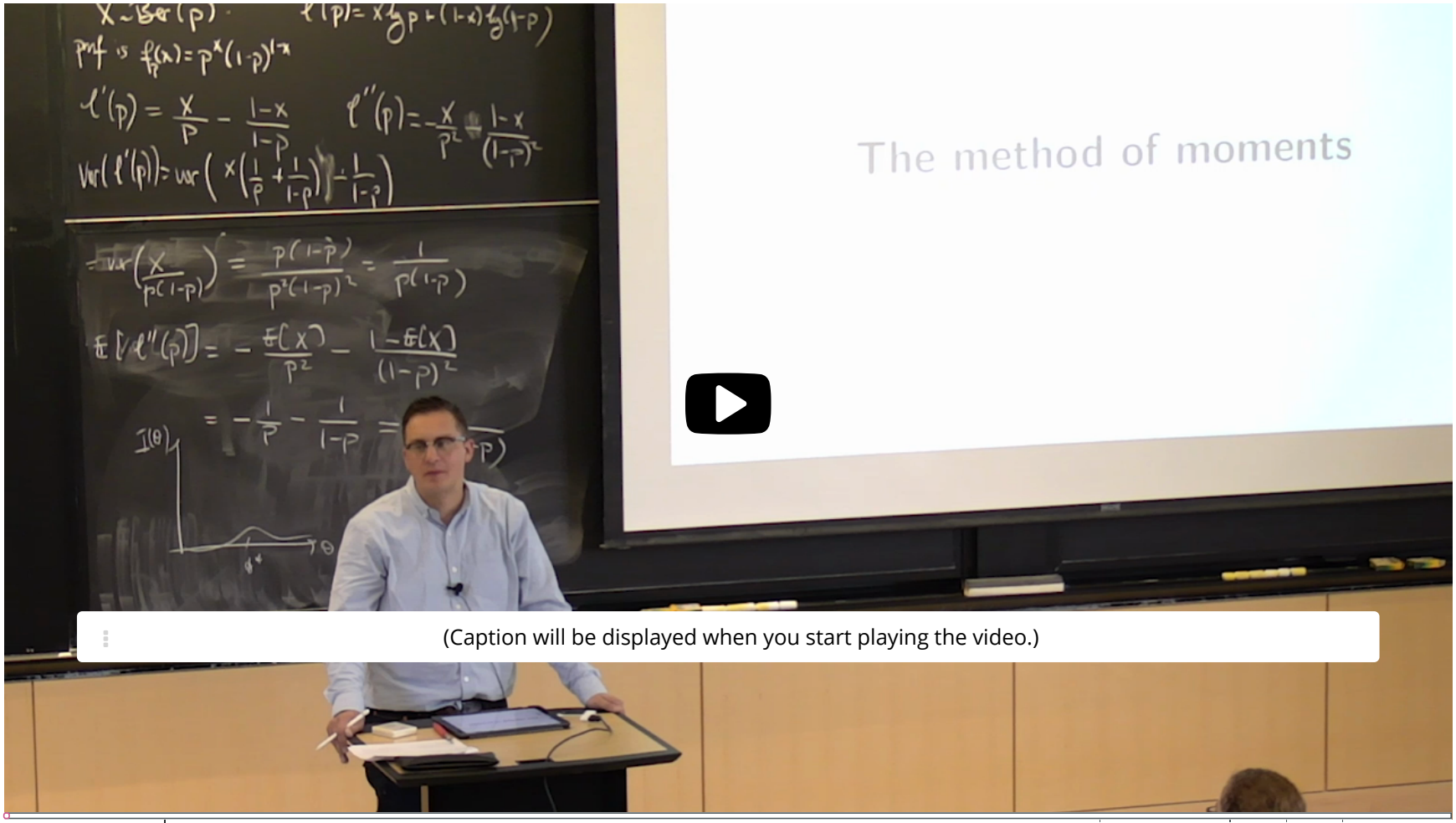
$$\frac{1}{n} \sum_{i=1}^{n} X_i^k \to \mathbb{E}[X^k],$$

where the convergence is in probability.

Submit You have used 1 of 2 attempts

Answers are displayed within the problem

Moments: Definitions



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