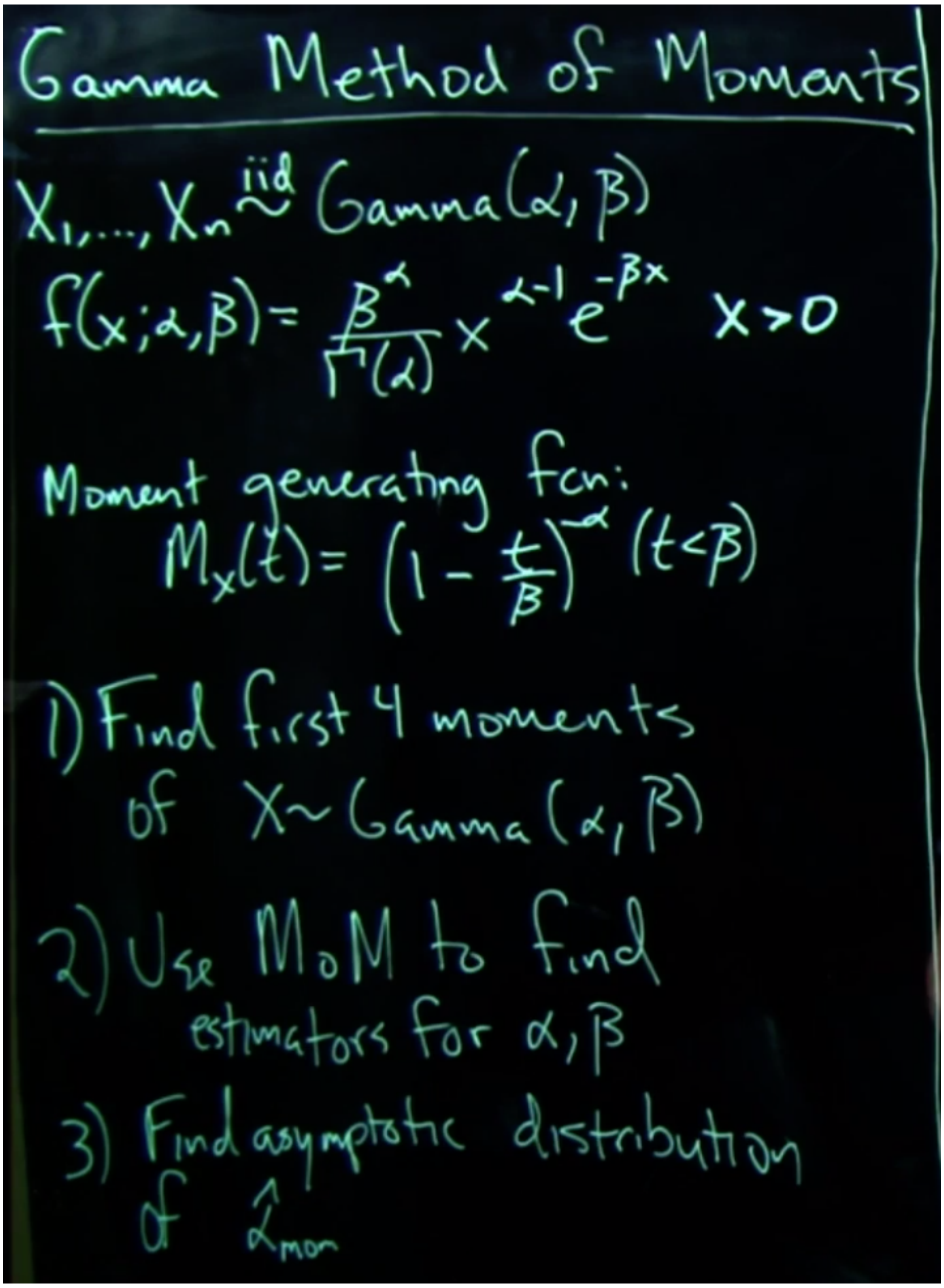
Unit 3 Recitation

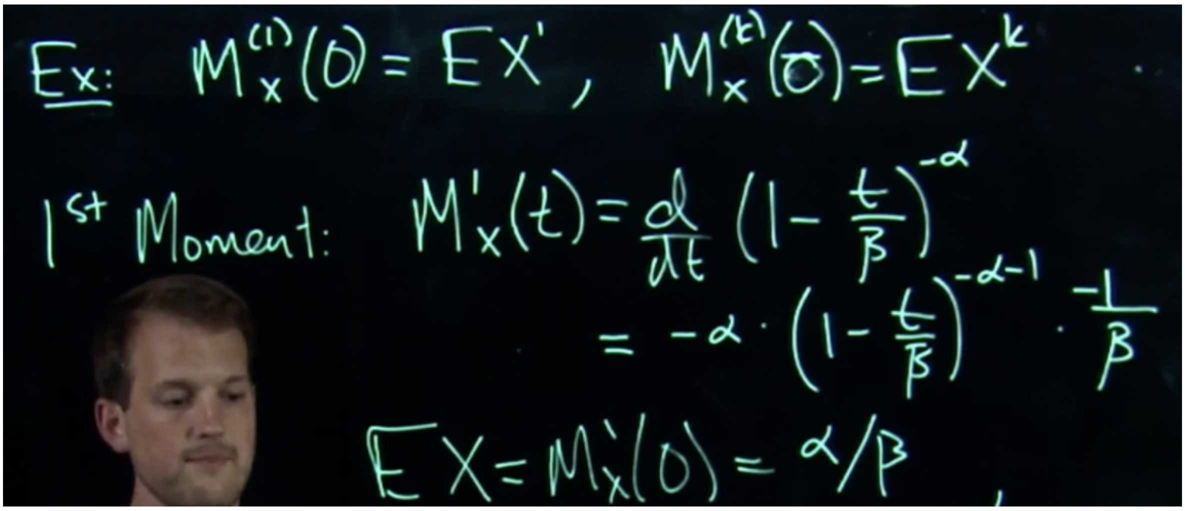
Method of moments

- gamma distribution
- x > 0
- want to find some moments to use them to find estimators of alpha and beta

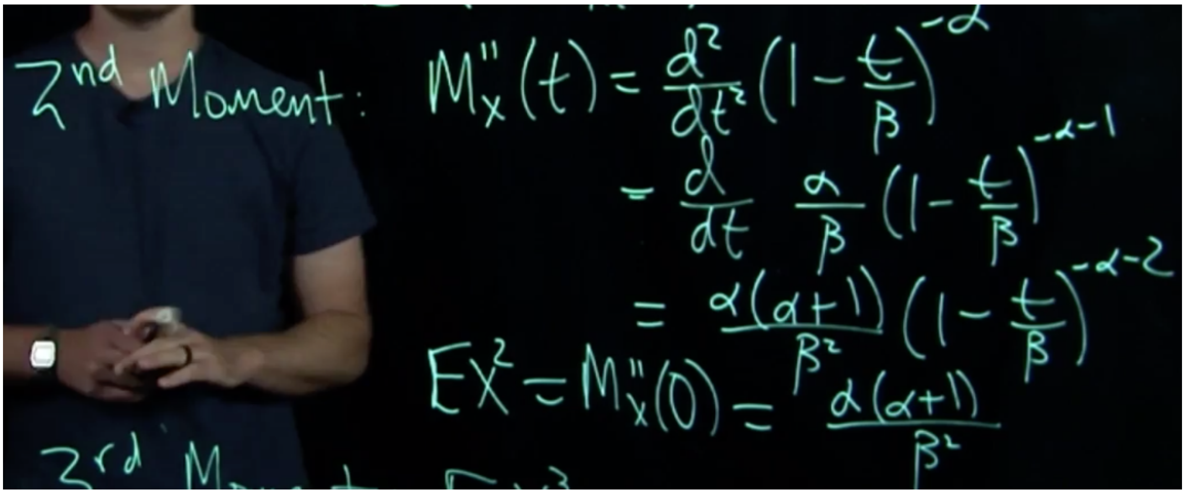


- use moment generating function by taking derivatives
- k'th derivative gives k'th moment

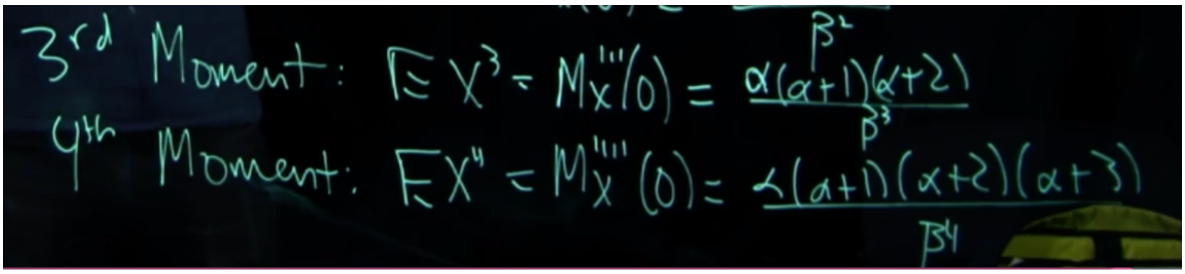
1. Find the first 4 moments



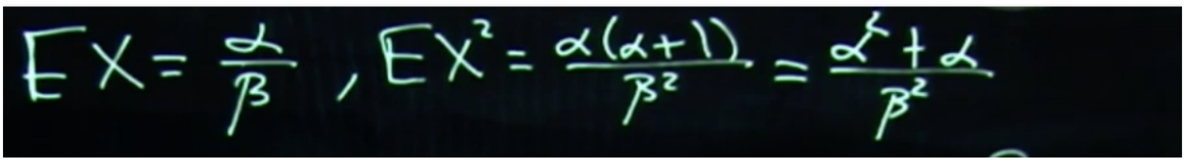
– apply chain rule for derivative (derive outside then inside separately)



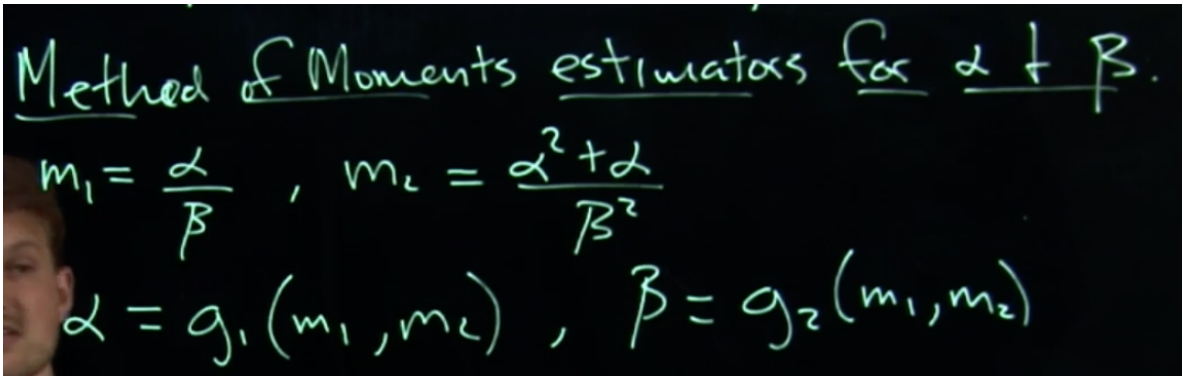
– just keep taking the next derivative



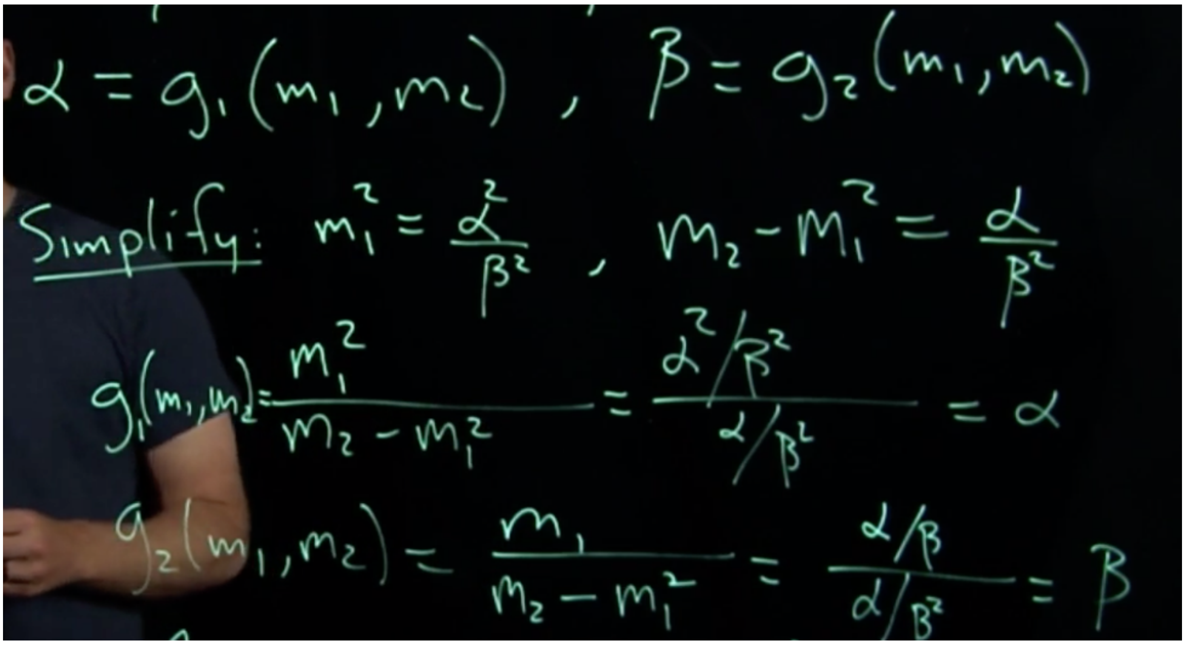
2. Use MoM to find estimators



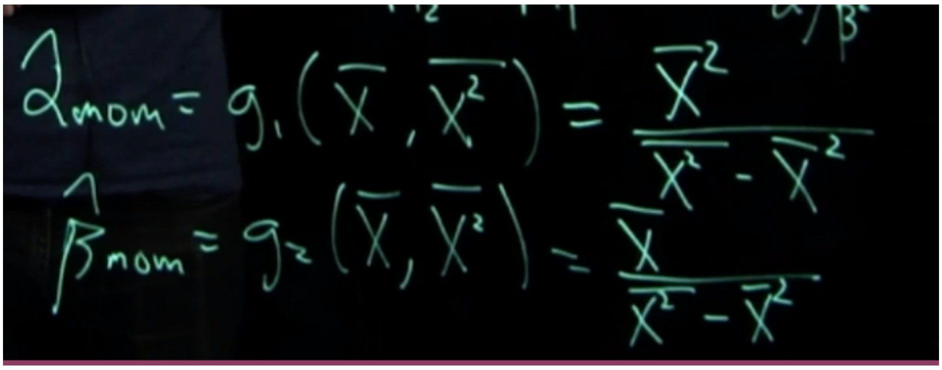
– starting with first 2 moments



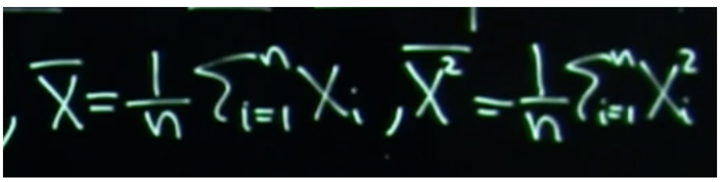
- combining m_1 and m_2 to find alpha and beta



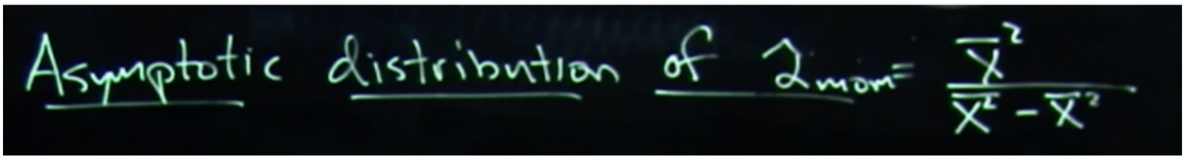
- find alpha and beta by trying different combinations of m_1 and m_2 such that terms cancel



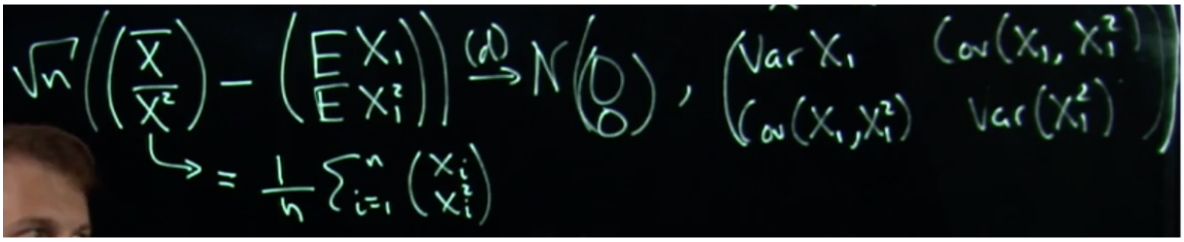
- then to get estimators for alpha and beta we plug in the sample means where:



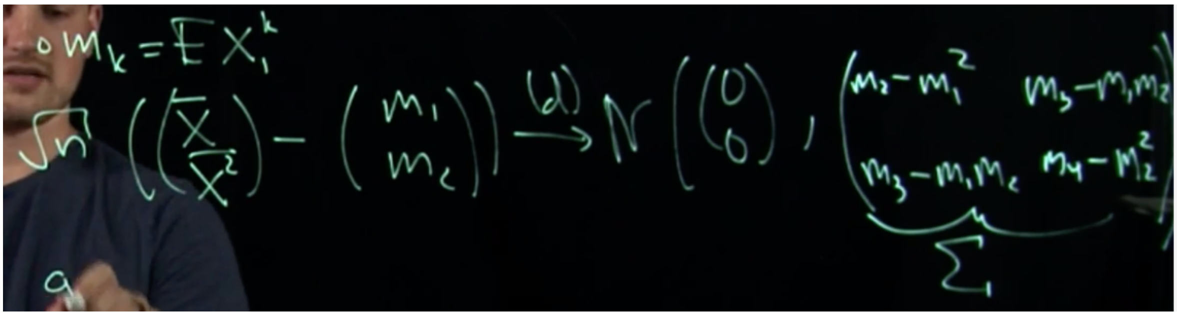
3. Find asymptotic distribution of alpha_hat



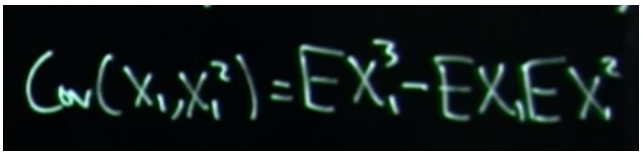
use multivariate central limit theorem

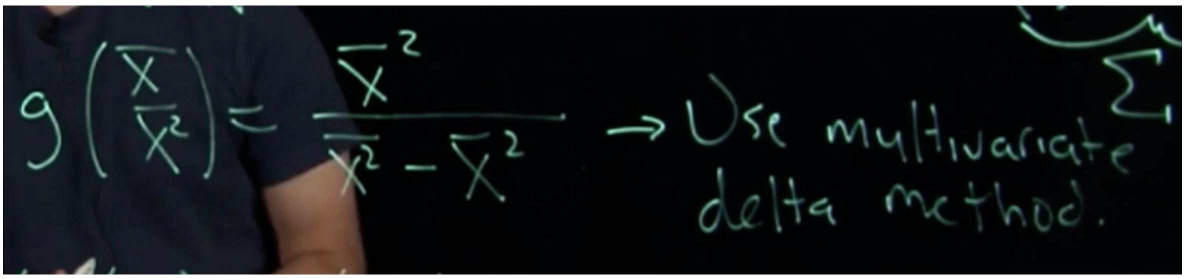


- we calculated EX_1 and EX^2_1 earlier

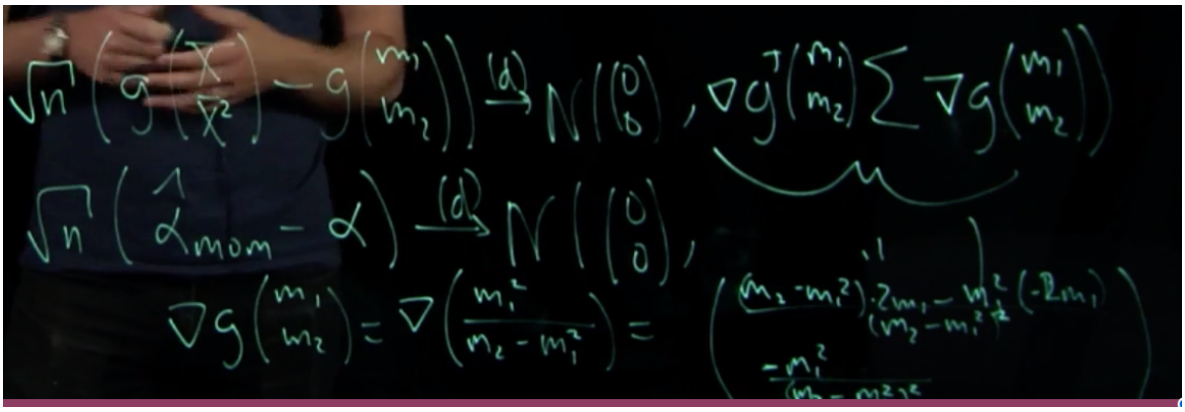


- variance is m_2 - (m_1)^2
- using:





using the multivariate delta method



- gradient of g found by taking derivative wrt m_1 (quotient rule), then wrt to m_2