

Math 262

Section 4.5

Day 34

1. Let X_1, X_2, \dots, X_{300} be iid random variables with mean μ_X and standard deviation σ_X . Also let $T = X_1 + X_2 + \dots + X_{300}$ and $\bar{X} = \frac{T}{300}$.

(a) What are μ_T , σ_T , $\mu_{\bar{X}}$, and $\sigma_{\bar{X}}$?

(b) What distributions are good approximations for T and \bar{X} ?

2. Use the `Convolve` function in Mathematica to plot the pdf of $X_1 + X_2 + \dots + X_n$, where each $X_i \sim \text{Unif}[0, 1]$ and $n \in \{1, 2, 3, 4, 5, 6\}$. Compare each pdf with the pdf of a normal distribution.

3. Let random variable X have one of the following distributions. For what distribution of iid random variables Y_1, Y_2, \dots, Y_n is it the case that $X = Y_1 + Y_2 + \dots + Y_n$?

(a) $X \sim \text{Bin}(n, p)$

(b) $X \sim \text{Gamma}(\alpha = n, \beta)$

(c) $X \sim \text{Poisson}(\lambda = n)$

(d) $X \sim \text{NegBin}(r = n, p)$

