Chapter 8 (part 2) and Chapter 9 (part 1)

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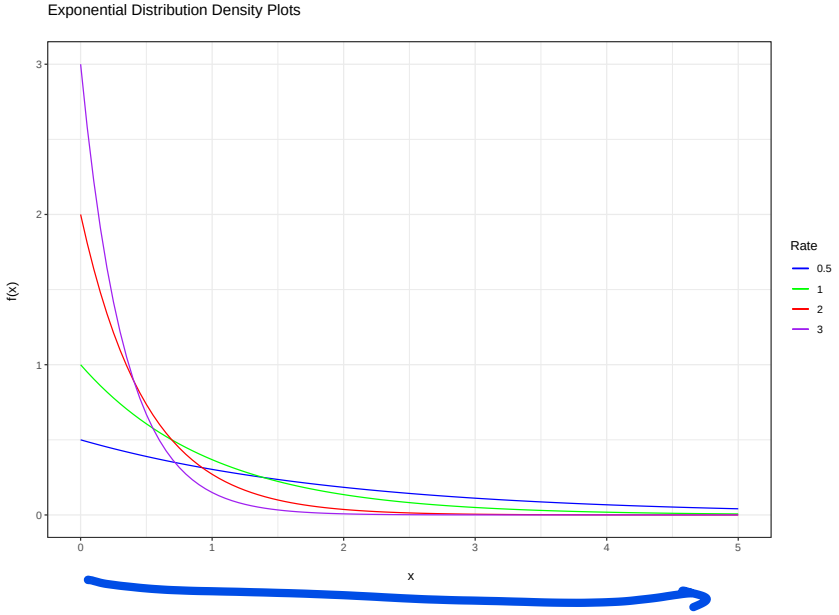
Quick review (1)

- Exponential Random Variable:
  - Defined by parameter λ.
  - $\mu = \sigma = \frac{1}{\lambda}$.
  - $P(X < x) = 1 - e^{-\lambda x}$
  - $P(x_1 < X < x_2) = P(X < x_2) - P(X < x_1) = e^{-\lambda x_1} - e^{-\lambda x_2}$
  - relationship between Poisson RV and Exp RV, read this.

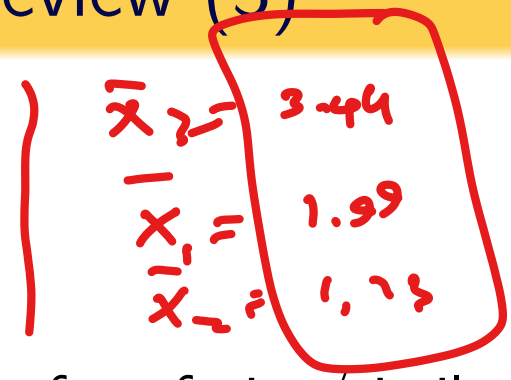


Quick review (2)

Other distributions:

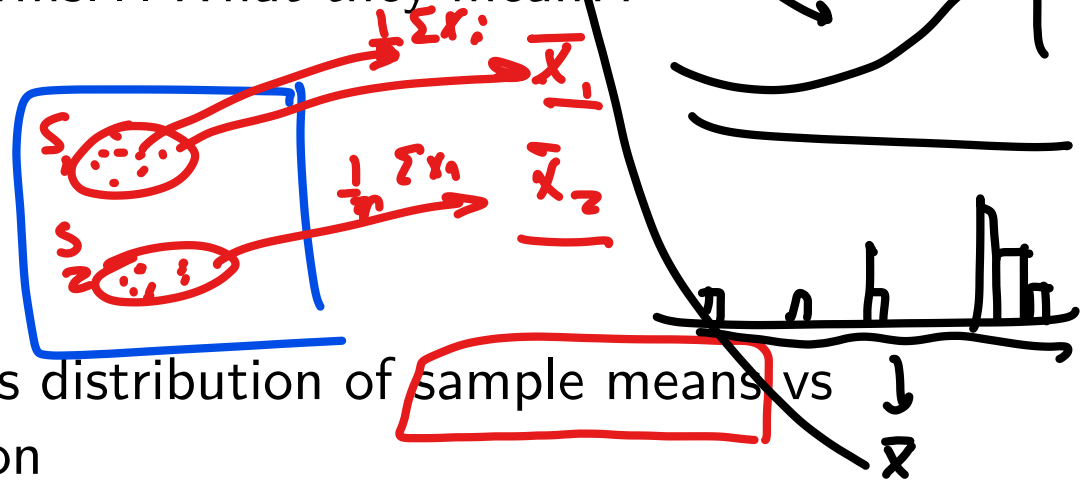
- Student's t distribution with parameter ν (called **"degrees of freedom"**).
  - $E(t) = 0$
  - $V(t) = \frac{\nu}{\nu-2}$ for $\nu > 2$
- χ^2 (pronounced Chi-squared) distribution with parameter ν.
  - $E\left(\chi^2_\nu\right) = \nu$.
  - $V\left(\chi^2_\nu\right) = 2\nu$.
- F distribution with two parameters ν_1 and ν_2.
  - $E(F_{\nu_1,\nu_2}) = \frac{\nu_2}{\nu_2-2} \quad \nu_2 > 2$.
  - $V(F_{\nu_1,\nu_2}) = \frac{2\nu_2^2(\nu_1+\nu_2-2)}{\nu_1(\nu_2-2)^2(\nu_2-4)} \quad \nu_2 > 4$

Quick review (3)



A lot of confusing/similar terms. . . What they mean??

- Population
- Sample
- Sample means
- distribution of sample vs distribution of sample means vs distribution of population



Quick review (4)

Central Limit Theorem

The sampling distribution of the mean of a random sample drawn from any population is approximately normal for a sufficiently large sample size.

- Mean of distribution of the sampling mean is the same as mean of the population, $\mu_{\bar{X}} = \mu$
- Standard deviation of the sampling distribution (standard error of the mean is $\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}}$
- $\bar{X} \sim N(\mu, \frac{\sigma}{\sqrt{n}})$.
- Finite population correction for standard error:

$$\sigma_{\bar{X}} = \sqrt{\frac{N-n}{N-1}} \cdot \frac{\sigma}{\sqrt{n}}$$

  - Rule of thumb: Use for population that is at least 20 times larger than the sample size