Stat 343, Tue 27-Oct-2020 -- Tue 27-Oct-2020
Probability and Statistics
Fall 2020

---
Tuesday, October 27th 2020
---
Wk 9, Tu
Topic:: Sampling distributions, etc.
Read:: FASt 4.3

2.109

$X_1$ = # of meals purchased until get prize 1.
$\vdots$
$X_i$ = # of meals purchased until get prize i

iid?

What distribution?

$$X_i - 1 \sim \text{Geom}(\pi = 1/10)$$

---

Q: Difference between $E(3X)$ and $E(X_1 + X_2 + X_3)$

roll 5
$3X \to 15$

$1 + 4 + 2 = 7$

---

Friday: Some take-home problems

4.3 **Estimates, estimators, and distributions**

Distinction between

- population and sample
- parameters and statistics
- estimators and estimates
- sample distribution and sampling distribution

Estimator is a variable, estimate is value of that variable

parameters: inherent vals. built into population
- $\lambda$ (exponential/Poisson), $\alpha$ $\beta$ (Beta, Weibull)
- moments $\left(E(X), E(X^2), \ldots, Var(X), \ldots\right)$

statistics: $\bar{x}$, $S$, $\frac{1}{n}\sum_{i=1}^{n} x_i^k$ computed from sample

**Sampling methods**

There are all kinds of ways to take a sample. To name a few:

- convenience sample notably nonrepresentative
- voluntary sample
- systematic sample
- simple random sample (SRS)
- i.i.d. sample

Sampling distribution of the sample mean $\bar{X}$ (SRS, $n = 20$)

Distinction between $\overline{X}$, $\bar{x}$

capitals

$$\overline{X} = \frac{1}{n}(X_1 + X_2 + \cdots + X_n)$$

process followed

a r.v. whose value $\bar{x}$ changes from sample to sample.