

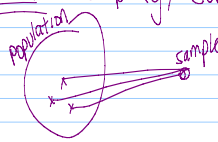
27 students

C11: Random  
Know possible outcomes, but not individual

Sampling w/ Minitab

- Uniform (Sample from columns)
- Normal (mean, SD)
- Probability Model (Discrete)
- Other (as instructed)

C12: Sampling/Surveys



SRS: every person has equal chance of being sampled.

Parameter  
 $\mu, \sigma, p$

Statistic  
 $\bar{Y}, s, \hat{p}$

Minitab > Enter sampling frame CI  
> Sample from Cells

Why sample? To estimate a parameter.

Bias = under/over-coverage

- \* convenience sample
- \* nonresponse bias
- \* Voluntary response bias - \$
- \* Response bias - anything from interviewing

} eliminate Bias:  
**RANDOMIZE**

C13: Experiments and Observational studies

Experimentally assigns treatment

Subject chooses treatment

Cause/effect possible

only associational conclusions

Principles of Experimental Design

- 1 Blocking - form groups of similar subjects
- 2 Control - have some "environment"
- 3 Randomize - treatment/not
- 4 Replicate - multiple subjects in each treatment group

Parts of Exp: An experiment has at least one response, at least one factor (treatment) at at least two levels

Control = 0 level treatment

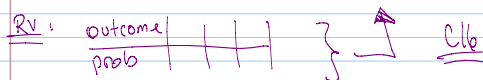
Probability (C14) - study CW, HW

1 Data oriented  
\* table  
\* %

2 Event  
\* Roll die  
\* Draw a card

LLN - As  $n \uparrow$  rel. freq.  $\rightarrow$  get close to perfect/theoretical prob.

Expected Val / Mean and SD



C17: Bernoulli(p)

- 1 2 outcomes
- 2 p constant
- 3 trials indep.

$E(X) = p$

$SD(X) = \sqrt{pq}$

$f = 1-p$

Binomial (n, p)

- 1 Fixed number of Bernoulli trials
- 2 Counting # of Successes

$E(X) = np$   
 $SD(X) = \sqrt{npq}$

Answer Prob Q5:

Ex: What is prob. of exactly 5 successes in 10 trials?  
" " " less than 5 " "  
" " " more than 5 " "  
" " " at least 5 " "  
" " " at most 5 " "

Outcomes Possible: 0, 1, 2, ..., n  $\leftarrow$  CI  
C2: minitab > Calc > Prob Dist > Bin

Normal Approx to Binomial

If  $np > 10$  and  $ng > 10$ ,

THEN  $Bin(n, p) \sim N(np, \sqrt{npq})$



too low  $\Rightarrow p$  is too high.