

# Statistics

Prof. Battaly, WCC

**Text:**  
**INTRODUCTORY STATISTICS.**  
10th ed. N.A.Weiss 2016

**Calculator: TI83 or TI 84**

Web site: [www.battaly.com/stat](http://www.battaly.com/stat)

Special assignment. Be ready to discuss on Monday.

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## Ch. 1.1 Nature of Statistics

### Goals:

1. Consider the nature of statistics and what it includes
2. Understand the difference between Descriptive Statistics and Inferential Statistics
3. Distinguish between an Observational Study and a Design Study

Study Ch. 1.1, p. 7 #1- 21 odd

#9,#19 different probl, but same type

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## Ch. 1.1 Nature of Statistics

### Statistics ?

When you hear the word statistics,  
what comes to your mind?

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## Ch. 1.1 Nature of Statistics

### Statistics

#### 1. Descriptive Statistics

- > **organizing** information
- > **summarizing** information
- > computing basic characteristics, like mean, standard deviation, etc.

#### 2. Inferential Statistics

- > drawing **conclusions** about a **population** based on a **sample**

**Population:** all the individuals under consideration in a statistical study

**Sample:** part of the population from which data is obtained

- > associate **conclusions** with level of **reliability**

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## Ch. 1.1 Nature of Statistics

### Collecting Data:

1. Click on the following excel file and enter the heights of the students in class

 student height

Student	ft	in	Total in
1	5	4	64
2			
3			
4			
5			

2. Is the complete list a population or a sample?

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## Ch. 1.1 Nature of Statistics

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2. Is the complete list a population or a sample?

If we are concerned with:

1. only the students in this class, then population
2. all WCC students taking Statistics this semester, then sample.

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## Ch. 1.1 Nature of Statistics

We use sample data to make inferences about populations.

### What kind of inferences?

eg: If we read about a study where levels of blood cholesterol were positively correlated with weight, could we conclude...?

- a) that high cholesterol causes a person to be overweight?
- b) being overweight causes a high cholesterol level?

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## Ch. 1.1 Nature of Statistics

Study Type	Data	Relationship of Variables
<b>Observational Study</b>	observe characteristics w/o manipulation	<b>association</b>
<b>Design Experiment</b>	determine treatment & control	<b>causation</b>

Which type of study?  
*both NYT*

*link 1*



July 31, 2019  
search:" for the new study"

*link 2*



Aug 14, 2019  
search:" for the new study"

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## 1.2 Simple Random Sampling

### Why sample?

Sample vs Census

### How to sample?

eg: FDR vs Alf Landon

### Need a **Representative Sample**

If not representative, conclusions will not be valid.

Study 1.2 #27, 29, 31(33), 33(35), 41(~31),  
43(37), 44(~39)

Special assignment. Be ready to discuss on Monday, describing:  
Descriptive vs. Inferential Statistics  
Observational vs Design Study



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## 1.2 Simple Random Sampling

Special assignment. Be ready to discuss on Monday, describing:  
Descriptive vs. Inferential Statistics  
Observational vs Design Study



Fiber article by Carl Zimmer: NYT Jan 2, 2018				
For the studies discussed in the article, identify its Purpose, the Variable(s), and Types of Study				
STUDY	PURPOSE	VARIABLE(S)	Observational or Design?	Descriptive or Inferential?
1. Gewirtz				
2. Backhed				

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## 1.2 Simple Random Sampling

Special assignment. Be ready to discuss on Monday, describing:  
 Descriptive vs. Inferential Statistics  
 Observational vs Design Study



STUDY	PURPOSE	VARIABLE(S)	Observational or Design?	Descriptive or Inferential?
1. Gewirtz	High Fat diet: Does the amount of fiber impact the population of gut bacteria?	amount of fiber, bacteria population	<b>Design</b> "Put mice on..."	<b>Inferential</b> - study is intended to understand human health
2. Backhed	High Fiber switched to Low Fiber diet: Does the amount of fiber impact the species of gut bacteria?	amount of fiber, species of bacteria population	<b>Design</b> "Shifted diet from high fiber to low fiber - McDonald's..."	<b>Inferential</b> - study is intended to understand human health

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## 1.2 Simple Random Sampling

### Simple Random Sampling

- > each individual of population is **equally likely to be selected**
- > without bias in selection

### How to get a simple random sample?

- > draw from hat
- > drum roll

Use a random number table or random number generator

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From our student heights, find a sample of 8.  
Use table to select positions of data

Student	ft	in	Total in
1	5	4	64
2			
3			
4			
5			

Random Number Table

Line number	Column number									
	00-09		10-19		20-29		30-39		40-49	
00	15544	80712	97742	21500	97081	42451	50623	56071	28882	28739
01	01011	21285	04729	39986	73150	31548	30168	76189	56996	19210
02	47435	53308	40718	29050	74858	64517	93573	51058	68501	42723
03	91312	75137	86274	59834	69844	19853	06917	17413	44474	86530
04	12775	08768	80791	16298	22934	09630	98862	39746	64623	32768
05	31466	43761	94872	92230	52367	13205	38634	55882	77518	36252
06	09300	43847	40881	51243	97810	18903	53914	31688	06220	40422
07	73582	13810	57784	72454	68997	72229	30340	08844	53924	89630
08	11092	81392	58189	22697	41063	09451	09789	00637	06450	85990
09	93322	98567	00116	35605	66790	52965	62877	21740	56476	49296
10	80134	12484	67089	08674	70753	90959	45842	59844	45214	36505
11	97888	31797	95037	84400	76041	96668	75920	68482	56855	97417
12	92612	27082	59459	69380	98654	20407	88151	56263	27126	63797
13	72744	45586	43279	44218	83638	05422	00995	70217	78925	39097
14	96256	70653	45285	26293	78305	80252	03625	40159	68760	84716
15	07851	47452	66742	83331	54701	06573	98169	37499	67756	68301
16	25594	41552	96475	56151	02089	33748	65289	89956	89559	33687
17	65358	15155	59374	80940	03411	94656	69440	47156	77115	99463
18	09402	31008	53424	21928	02198	61201	02457	87214	59750	51330
19	97424	90765	01634	37328	41243	33564	17884	94747	93650	77668

tables

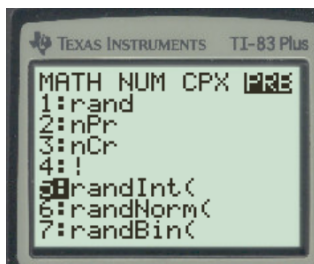
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27  
21  
7  
11  
6  
8

From our student heights, find a sample of 8.  
Use calculator to select positions of data

Student	ft	in	Total in
1	5	4	64
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**MATH/PRB/5**  
randInt(1,24,8)  
selects 8 random numbers  
from 1 to 24

tables

1. convenient to use
2. problems bec. when turn calc off and on, get exactly the same numbers
3. ∴ use **MATH/PRB/1** first to seed the random # generator. (Can seed with date to be sure different each time.)

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8  
9  
11  
7  
15  
12  
13

## Attachments

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studentHeight\_rev.xls

studentHeight.xls



studentHeight.xls

studentHeight.xlsx



studentHeight.xlsx