

Name: Key

Unit 3 - Review (2) - Short Answer
(in class)

1. It is known that in a specific city the chance that a person has a special gene marker for breast cancer is 14%. A researcher wants to conduct a study of 5 people with these markers. How large of a sample will he need to take from the population of the city to make sure he has 5 subjects with the gene marker? Write instructions for a simulation and conduct three trials. Clearly label each trial and state conclusion.

58280 17867 07990 85055 55279 83390 37598 93350 05666 55402
~~87042~~ 55080 76185 19947 79551 77594 87381 99430 44251 ~~30896~~
 72183 39856 94385 55160 50680 68443 95437 74302 06204 71004
~~76768~~ 16066 94109 90685 92058 81744 99133 36354 34292 90092
 21703 64616 03431 47610 31968 61593 36259 70600 53491 95542
 78269 12087 32204 81177 30333 83630 06026 89308 94179 54907

Component: one person

Trial: until he gets 5 subjects w/ the gene marker

response variable: # of people needed to get 5 ppl w/ gene marker

let 00-13 = w/ gene marker

14-99 = w/o gene marker

Trial	
1	25
2	45
3	14

$$\frac{25+45+14}{3} = 28$$

2. It is known that in a specific city the chance that a person has a red hair is only 1 in 7. A researcher wants to conduct a study to see on average how many people in Philadelphia have red hair in a sample of 5 people. Write instructions for a simulation and conduct 10 trials. Clearly label each trial and state your conclusion for the average number of people with red hair in Philadelphia.

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Red $\frac{1}{7}$ NOT Red $\frac{6}{7}$

0 - Red
 1-6 = NOT Red
 ignore 7, 8, 9

T	# of Red
1	1
2	3
3	0
4	1
5	2
6	0
7	2
8	2

9 0
10 0

$$\frac{2+6+3}{10} = \frac{11}{10} \approx 1.1$$

# red heads	frequency
0	4
1	2
2	3
3	1
4	0
5	0

3. **Security.** There are 20 first-class passengers and 120 coach passengers scheduled on a flight. In addition to the usual security screening, 10% of the passengers will be subjected to a more complete search.

a) Describe a sampling strategy to randomly select those to be searched.

stratified sampling strategy To ensure that passengers from 1st class, as well as coach, get searched.
2 from first class 1 12 from coach passengers

b) Here is the first-class passenger list and a set of random digits. Select two passengers to be searched, carefully demonstrating your process.

~~65436~~ 71127 04879 41516 20451 02227 94769 23593

01 Bergman	06 Cox	11 Fontana	16 Perl
02 Bowman	07 DeLara	12 Forester	17 Rabkin
03 Burkhauser	08 Delli-Bovi	13 Frongillo	18 Roufaiel
04 Castillo	09 Dugan	14 Furnas	19 Swafford
05 Clancy	10 Febo	15 LePage	20 Testut

01-20

ignore 00, 21-99 and any repeats

Fontana
Castillo

4. **Tips.** In restaurants, servers rely on tips as a major source of income. Does serving candy after the meal produce larger tips? To find out, two waiters determined randomly whether or not to give candy to 92 dining parties. They recorded the sizes of the tips and reported that guests getting candy tipped an average of 17.8% of the bill, compared with an average tip of only 15.1% from those who got no candy. ("Sweetening the Till: The Use of Candy to Increase Restaurant Tipping." *Journal of Applied Social Psychology* 32, no. 2 [2002]: 300-309)

a) Was this an experiment or an observational study? Explain.

experiment

treatments were imposed on randomly assigned groups.

1 factor (candy)

2 level (candy or no candy)

2 treatments

b) Is it reasonable to conclude that the candy caused guests to tip more? Explain.

response variable: % of the bill given as a tip.

As long as the decision was made just before the check (whether to give candy or not) was delivered, then

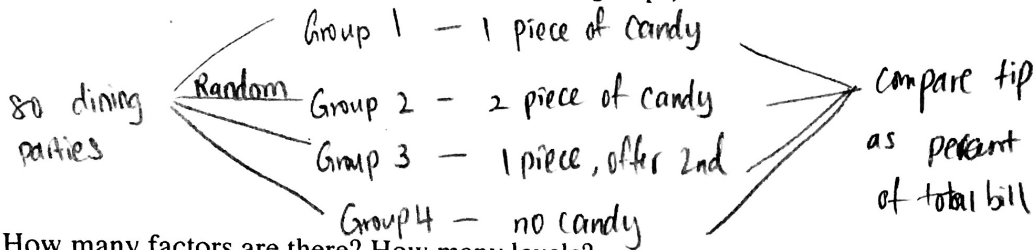
it is reasonable to conclude causation.

The researchers said the difference was statistically significant. Explain in this context what that means.

The difference in the % of tips btw the candy and no candy groups was more than expected due to sampling variability.

Tips, take 2. In another experiment to see if getting candy after a meal would induce customers to leave a bigger tip, a waitress randomly decided what to do with 80 dining parties. Some parties received no candy, some just one piece, and some two pieces. Others initially got just one piece of candy, and then the waitress suggested that they take another piece. She recorded the tips received, finding that, in general, the more candy, the higher the tip, but the highest tips (23%) came from the parties who got one piece and then were offered more. ("Sweetening the Till: The Use of Candy to Increase Restaurant Tipping." *Journal of Applied Social Psychology* 32, no. 2 [2002]: 300-309)

a) Diagram this experiment. (there are 4 treatment groups)



b) How many factors are there? How many levels?

1 factor
4 levels

c) How many treatments are there?

4 treatments

d) What is the response variable?

% of the total bill left as a tip

e) Did this experiment involve blinding? Double blinding?

diners were not aware, the the experiment was single-blinded.

No way to double blind this experiment, since there is no need to blind the evaluator of the response variable.

6. A management student takes a survey of student attitudes toward part-time work while attending college. He asks a large group of randomly selected students from numerous colleges and finds that 67% of them have a positive attitude toward part-time work while in college.

a) In this situation what is the statistic?

67%

b) In this situation, what is the parameter of interest?

% of students who have a positive attitude toward part-time work while in college.