

APS practice for test one:

- 1) Sampling techniques: Suppose you want to determine the average amount of money students at NPHS spend on lunch on any given day.

Come up with a sampling method that would get 40 people in your sample if you did a

- a) Simple random Sample
- b) Systematic sample
- c) Cluster sample
- d) Stratified sample
- e) Convenience sample

- 2) Determine a sampling method that would lead to a clearly biased sample for the above situation.

- 3) Write two versions of the same question (regarding any topic) that displays an obvious example of response bias.

- 4) What is a population parameter? What is the only way to get the population parameter?

- 5) What do statisticians use to estimate a population parameter?

- 6) What is the main difference between a study and an experiment?

- 7) A dog food company wants to compare a new lower calorie food with their standard dog food to see if it is effective in helping inactive dogs maintain a healthy weight. They have found several dog owners willing to participate in a trial. The dogs have been classified as small, medium, or large and active or inactive. How would you design the experiment (be sure to include clear communication of the factor(s), level(s), treatment(s) and the response variable.

- 8) When can a researcher claim that the treatment caused the response variable?

- 9) When can a researcher use the term "statistically significant"?

- 10) Give an example of a confounding variable in the experiment you designed in #7.

# Solutions to Practice test I APS

- ① Number all students that attend the school a unique number then either use a random number table or Random # generator to get 40 different numbers. The people who have those numbers will be in your sample.
- a) Stand at the Front door of the building (assuming Everyone enters from that way) and select the 5<sup>th</sup> (or whatever<sup>th</sup>) person entering to be in your sample.
- b) Go to one representative class or study hall and ask all 40 people in the class.
- c) Separate the student body into Four strata based on Class [Fresh... soph... Jun... Sen...] then Randomly select either 10 from each grade or some number from each grade that is a proportion of each grade's total Population proportion.
- d) Just ask any 40 people you can.
- ② Ask 40 people as they come off the lunch line... (the clear bias is these people already spend some money .... but not everyone does in the school)



③ One question should have a "positive Spin" to it and the other a "negative Spin" but the underlying question should be the same....

I gave the Syria question as an Example.

④ The True value for your question of interest.  
the only way to get this is to do a Census.

⑤ a statistic

⑥ in an Experiment one ~~do~~ needs to administer some treatment.

in a study the researcher merely observes what happens with out control over matters.

⑦ "See other paper"

⑧ when the results are statistically significant

meaning the different observations made are more

different than Sampling Variability would have been.

⑨

(10) I included this in my write up ....

(11)

a] When you Roll two dies there is not an Equally likely chance of getting all sums. So you shouldn't use the same # & #'s to ~~represent~~ represent each outcome.

b] that would be assuming the player makes 50% of his shots.... that probably is False

c] The actual percents don't match the simulation percents.

(12) According to the Simulation, ~~24~~ on average 24% of people<sup>max</sup> contract the disease.

(13) "see other paper"

#s 7 and 10

### The dog food experiment

As a researcher I want to investigate the effects a newer low calorie dog food has on weight for a variety of different dogs. I have gathered a bunch of dogs and placed them into one of six groups: large active, large inactive, medium active, medium inactive, small active and small inactive. Each group will undergo an initial data gathering session where their current diet, current weight, and current life style will be recorded. Once the initial data collection phase is through, I will divide each group into two. So now there should be two large active groups, two large inactive groups, etc. I am now ready to instruct the dog owners of the various treatments that need to be administered. I want one of each of the "subgroups" to receive the regular food and one to receive the lo-cal food. This will insure that each size and lifestyle gets each kind of food. After treatments are used for some set amount of time (maybe a few weeks) I would re-evaluate the dogs and see if there are any statistically significant differences between the average weight loss an inactive dog had not using lo-cal food and using the lo-cal food.

A possible confounding variable in this experiment is the BREED of the dog. (there are other confounding variables like how active is active (or how inactive is inactive), etc.) OR maybe age of the dogs mattered....

The factors used in this experiment were food type and size of dog and activity level

There were 2 food type levels, three size levels, and two activity levels

There were a total of 12 treatments

The response variable is change in weight per dog and then average weight loss across each group

#13

#### The simulation

I want to investigate the average number of kids a family would have if the parents wanted at least one of each gender kid. To research this idea, I set up a simulation whereby I used the random numbers given in the following way. I will let the digits 00-59 represent having a girl and 60-99 represent having a boy. I will look at random numbers two at a time and keep track of how many kids a family could have until they get at least one of each gender, I can re-use numbers because they represent a percent of a success. A trial is through when a family has at least one boy and one girl. I will then record how many kids they had and continue a new trial where the old trial ended.

Trial	1	2	3	4	5	6	7	8	9	10
outcome	3	2	3	4	2	2	2	3	8	4

Based on this simulation I would expect the average number of kids a family needs to have to insure one of each gender kid is 3.3 kids per family.



11) Explain why this would be a bad simulation:

- a) Use the numbers 2 – 12 to represent the sum of two die rolls
- b) Use an even digit to represent a basketball player making a foul shot and an odd number to represent the player missing the shot. Run several trials to get a sense of how many foul shots out of ten the player makes
- c) I want to know how often I pull an ACE from a standard deck of cards after picking 5 cards. Let the number 01 represent getting an ace and all other numbers a non-ace.

12) After simulating how a disease spreads in a population, the researcher concluded that "24% of people contracted the disease". What should the conclusion be?

13) Assume that there is a 60% chance of having a girl and a 40% chance of having a boy. How many kids would a family expect to have if they kept having kids until they had one of each gender? Use a well-designed and well communicated simulation to justify your results. (run at least 10 trials)

77921	06907	11008	42751	27756	53498	18602	70659
99562	72905	56420	69394	98872	31016	71194	18738
96301	91977	05463	07972	18876	20922	94595	56869
89579	14342	63661	10281	17453	18103	57740	84378
85475	36857	53342	53988	53060	59533	38867	62300
28918	69578	88231	33276	70997	79936	56865	05859
63553	40961	48235	03427	49626	69445	18663	72695
09429	93969	52636	92737	88974	33488	36320	17617
10365	61129	87529	85689	48237	52267	67689	93394
07119	97336	71048	08178	77233	13916	47564	81056

00-59 G  
60-99 B

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