HM3 Statistics Unit Review

(1) (a) every bottle from this company
(b) the volume of water inside the bottles
(c) 50 bottles selected
(d) 12 ounces
(e) 12.1 ounces

(2) Statistic - they want to represent all U.S. adults

(3) Parameter - they are stating that this is the average for all horses standing 16.2 hands high.

(4) Stratified. If you split them up by degree of sickness <u>then</u> randomly select some from each group to go to each hospital, it will be a more fair distribution. That way each hospital will get patients of all levels of sickness, instead of only one hospital getting <u>all</u> of the extremely sick people.

(5) Systematic - every 5th person

(6) Simple Random Sample. I <u>DO</u> have a problem with this method of sampling — there are many FV residents who are not homeowners who may have an opinion on this park!

(7) Voluntary Response. An advantage is that its very easy for the researcher. A disadvantage is that many people will see it and not respond, and other people may not see it at all!

(8) • Everyone in the population has the same probability of being chosen
• Every group of the sample size has the same probability of being chosen.

(9) (a) This is biased. People at an expensive restaurant probably are not on welfare. Since they themselves don't need it, they may have negative opinions on it.

(b) This is biased. People who subscribe to the NRA probably advocate for second amendment rights.

(c) This is biased. The results would be skewed depending on which grocery store they were at. People shopping at Aldi will spend less than people at Whole Foods.

(10) This is not a ~~fair~~ question. The researcher makes their opinion clear and tries to sway the response by saying things like "do you agree", "old-fashioned", "hard to buy clothes". A way to word the question so that it is not biased would be something like "Do you think the dress code is fair?"

(11) (a) "Do you think the main street should be widened?"

(b) "Do you think the current government should be re-elected?"

(c) "What movie should be named Movie of the Year?"

(d) "Do you think government policies should create jobs in your community?"

(12) $MOE = 1.96 \frac{s}{\sqrt{n}}$

$MOE = 1.96 \frac{11}{\sqrt{100}}$

$MOE = 2.156$

confidence interval: 112 ± 2.156

$109.844 - 114.156$

(13) $MOE = 1.96 \frac{s}{\sqrt{n}}$

$MOE = 1.96 \frac{2.1}{\sqrt{35}}$

$MOE = .6957$

confidence interval: $10 \pm .6957$

$9.3043 - 10.6957$ days

(or about 9-11 days)

(14) $MOE = 1.96 \sqrt{\frac{p(1-p)}{n}}$

$.02 = 1.96 \sqrt{\frac{.38(.62)}{n}}$

$.010204081 6 = \sqrt{\frac{.2356}{n}}$

$.000104123282 = \frac{.2356}{n}$

$.000104123282n = .2356$

$n = 2262.7024$

$n \sim 2263$ people

(15) $45/80 = .5625 \rightarrow 56.25\%$ would buy lunch

$MOE = 1.96 \sqrt{\frac{.5625(.4375)}{80}}$

$MOE = .1087$

confidence interval: $.5625 \pm .1087$

$.4538 - .6712$

so about $45\% - 67\%$

(16) $.05 = 1.96\sqrt{\frac{.76(.24)}{n}}$

$.0255102041 = \sqrt{\frac{.1824}{n}}$

$.000650770512 3 = \frac{.1824}{n}$

$.000650770512 3n = .1824$

$n = 280.283$

$n \sim 280$ people

(17) if we're cutting the MOE to 25% of what it is, we can multiply the MOE by 1/4 ... since it's an equation, we need to multiply both sides by 1/4!

$MOE = 1.96\frac{s}{\sqrt{n}}$

$\frac{1}{4} MOE = 1.96\frac{s}{\sqrt{n}} \cdot 1/4$

★re-write the 1/4 to be in a fraction with $s/\sqrt{n}$★

$1/4 MOE = 1.96\frac{s}{4\sqrt{n}}$

★move the 4 to be inside the square root so you can see the relationship with "n" the sample size★

$1/4 MOE = 1.96\frac{s}{\sqrt{16n}}$

★to cut the MOE to 25% you need to make the sample size 16 times larger★

(18) mean ± MOE = Confidence Interval

$83 - MOE = 82.02$ $\quad$ $83 + MOE = 83.98$

$MOE = .98$ $\quad$ $MOE = .98$

$.98 = 1.96\frac{s}{\sqrt{64}}$

$.5 = s/8$

$4 = s$

1st way: Use a random # generator. 1 represents a correct answer, 2, 3, and 4 represent incorrect answers. Generate 10 #s to represent one trial. Record whether or not you got at least 6 questions. Run at least 20 trials then find the proportion by doing

$$\frac{\#\text{ of trials w/ 6 or more correct}}{\text{total \# of trials}}$$

2nd way: Use a standard deck of 52 cards. Let spades represent a correct answer and let clubs, hearts, and diamonds represent an incorrect answer. Randomly select a card, record it, and place it back in the deck. Repeat until you have recorded 10 cards → this is one trial. Record whether or not you got at least 6 questions correct. Run at least 20 trials then find the proportion by doing

$$\frac{\#\text{ of trials w/ 6 or more correct}}{\text{total \# of trials}}$$

3rd way: Use a standard die. Let 1 represent a correct answer. Let 2, 3, and 4 represent an incorrect answer. 5 & 6 mean nothing, so if you roll a 5 or 6 don't record it - just roll again. Record whether or not you got at least 6 questions correct. Run at least 20 trials then find the proportion by doing

$$\frac{\#\text{ of trials w/ 6 or more correct}}{\text{total \# of trials}}$$

(a) observational Study. The students are choosing their groups instead of the researcher.

(b) Experiment. The researcher is assigning people to groups.

(c) Experiment. Researcher has an active role by choosing the participants and having them taste the orange juice.