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Stats Hw 6

7.4) $\bar{x}$ is equal to 2.93 & μ is 2.78

7.6) No because that is a sampling Bias. The heights samples taken from the basketball team would most likely be higher than that of the population and since the basketball team's height is not representative of the population, this inference cannot be made.

7.14) Random sampling means everyone has an equal chance of being selected, but in this case, the first 10 students could be selected if they all flip heads.

7.22) No because of sampling bias since students taking online curses wouldn't be physically present on the traditional campus to participate in the poll for average age of all students.

7.26)

a) $.09 \times 1000 = \boxed{90}$

b) Standard error = $\sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{.09(.91)}{1000}} = \boxed{.00904}$

c) we expect 9 % t's give or take 0.9 %.

7.28) Based on the shape of the graph's, we can tell that C has the largest sample size due to its shape resembling that of a bell curve & more centered. Thus, C is the biggest with graph b following second & graph A last due to graphs smaller widths corresponding to bigger sampling sizes because sampling proportion will come closer to population proportion.

7.36)

$\frac{.081 - .09}{.005} =$ z score $= -1$

Based on z-score table, probability that random sample of 1000 letters will contain $\leq 8.1\%$ t's is $\boxed{15.87\%}$

7.38) Std error $= \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{0.2(0.8)}{250}} = .025$

z score $= \frac{0.2 + 2(.025) - 0.2}{.025} = 2$

Based on z table, probability of 2 std deviations of being less than or equal to the mean is 97.72% so above the mean by 2 std deviations is $1 - 0.9772 =$

0.0228 or 2.28%

7.42)

a) This is greater than 50% since 50% is for the probability that 50% or more of the population will be living in poverty, which is further from the mean, meaning higher z-score & that the probability above this 50% will be less than 30%

b) Std Error $= \sqrt{\frac{0.25(0.75)}{400}} = .0216$ z score $= \frac{0.3 - 0.25}{0.0216} = 2.314$

Based on the z-tbl, 2.314 is equal to 0.9896 so $1 - 0.9896$ is .0104 or

1.04%

7.44)

a) Std error $= \sqrt{\frac{0.5(0.5)}{50}} = .0707$ $\frac{0.7 - 0.5}{.0707} = 2.82$ z-score

Based off the z-table, 2.82 is 99.76% probability so $1 - 99.76$ is **.0023 or .23%**

b) $\frac{0.3 - 0.5}{.0707} = -2.82$

Based off z-tbl -2.82 is .0024

Probability of females $\leq 30\%$ is .0024 or .24%

c) **the probability of part a is the same as part b**

d) It is not reasonable since both possibilities are more than 2 std deviations away from the mean, meaning it is unusual & not reasonable to believe.

7.48)

a) $\frac{663}{1004} * 100 = \boxed{66\%}$

b) Gallup polls are random ✓

There are more than 10 respondents for each side of the poll

$663 \geq 10$ & $1000 - 663 = 341 \geq 10$ ✓

Also, there are more than 10 * the amount of adults in the sample poll in the U.S ✓

c) z-score = ±2 for 95% confidence interval

Std Error = $\sqrt{\frac{.66(0.34)}{1004}} = .0149$

Margin of error = $z * SE = 2 * 0.0149$

$0.66 \pm$ margin of error = $\boxed{(0.6302, 0.6898)}$

7.50)

a) We are 95% confident that true voting populations supporting measure X is 49% give or take 3% or (0.46, 0.52)

$0.46 - 0.03 = 0.46$

$0.49 + 0.03 = 0.52$

b) We are 95% confident that the percentage of voters planning to support measure X is between 46% to 52%. Thus, since the percentage of votes supporting Candidate X needed to fail is < 50% & the percentage of votes needed to win is >50% and both possibilities are inside our interval, there is evidence that there is a possibility candidate X could lose

c) The sample wouldn't be representative of the population & since the opinions of people in Florida isn't included in the sample, there would be a sampling bias, meaning we can't use the sample to make predictions about the population due to bias.

7.58)

a) Even = 0, 2, 4, 6 & Thus, on average 50% of finding even numbered digit * 30 digits

odd = 1, 3, 5, 7, 9 = 15 digits

b) 80% Confidence level means we are confident that 80% of the true population falls within the interval given.

So the intervals expected not to capture 50% is $(1 - 0.8) * 30 = \boxed{6}$

7.62)

a) $\frac{203}{1974} = .1028$ or **10.28%**

b) margin of error = 2 * Std Error = 2 * .0068 = .01367

95% confidence interval = $0.1028 \pm .01367$ = **(.089, .1164)**

Std Error = $\sqrt{\frac{(0.1028)(1-0.1028)}{1974}} = .0068$

c) Since the 95% confidence interval doesn't include 0.3, it is not plausible.

7.64) This confidence interval says that we are 95% confident that the percentage of individuals with the statement "obesity impacts individuals, but doesn't have a major impact on society" is less for Democrats in comparison to Republicans by no more than 13% and no less than 2%. If 0 is included in the interval, we can't rule out the possibility of both Republicans & Democrats having the same percentage of people agreeing with this statement. The negative value in this case is that the democrats have a mean that is 2-13% lower than that of the republicans.

7.68)

a) The sample mean percentage that graduated for the preschool group boys is 0.5 while the sample mean percentage that graduated for non preschool boys is 0.53. However, we need to use confidence interval to prove that preschool was linked with higher graduation rates. It is not sufficient to base our conclusion off percentage only.

b) Both are randomly selected ✓
Both preschool & non preschool have at least 10 data values for graduating & not graduating HS. ✓
Both data sets have a population 10 x greater than the sample ✓
Both data samples are independent of each other. ✓

c) iii

d) wider since it encompasses more possible data points