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1.Parking is always a problem at UCLA for students who drive. These are the options available to the typical UCLA student commuter. On a random school day, parking in UCLA's parking lots is available for $7 about 10% of the time. Legal street parking is available for free and is available 40% of the time. The final option is to park illegally (without a parking permit) in UCLA's lots the rest of the time. If a student parks illegally, 9 times out of 10, the student will not be caught and thus parks for free. 1 times out of 10, the student will be caught and is subject to a $40 fine.

50%

a) What is the expected value of parking cost (in dollars) to the typical commuting UCLA student if he or she randomly employs all of the options (legal and illegal) listed above? (12 points)

outcome	$7	0	0	$40	
prob	.10	.40	0.45	0.05	=1.

$E(Y) = 0.10(7) + .40(0) + 0.45(0) + 0.05(40)$

$= .7 + 0 + 0 + 2.$

$= \$2.7.$

b) What is the standard deviation of those costs to the typical commuting UCLA student if he or she randomly employs all of the options (legal and illegal) listed above? (8 points)

$SD = \sqrt{0.10(7-2.7)^2 + 0.40(0-2.7)^2 + 0.45(0-2.7)^2 + 0.05(40-2.7)^2}$

$= \sqrt{\quad (4.3)^2 \quad (2.7)^2 \quad (2.7)^2 \quad (37.3)^2}$

$= \$8.8.$

c) Suppose there are only two kinds of students: moral and immoral. Moral students will only park legally, immoral ones will only park illegally. Given the options listed above, which type of student has the lower expected value (and therefore will ultimately pay less in parking in the long run)? Please show calculations for full credit. (7 points)

moral

outcome	$7	0	
prob	(.10)2	(.40)2	=1.

$E(Y) = 0.2(7) + 0.8(0) = \$1.4$

we doubled the proportions so that probability equals 1 on because a moral student only has 2 choices

immoral

outcome	$40	0
prob	.10	.90

$E(Y) = 0.10(40) + 0.9(0) = \$4$

a moral student has a lower expected value & therefore its the better deal.

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2. The UCLA-USC football game is the number one party event of the year for Bruins, exceeding even commencement celebrations (mostly because parents are present at commencement). Suppose it is known that the typical Bruin football party has 15 UCLA students on average with a standard deviation of 3.8 UCLA students. Many activities will occur on that game day and for all UCLA students, their activities will result in a mean change of –14% in their financial assets (e.g. cash, credit) with a standard deviation of 21%. None of the variables listed above are normally distributed.

Researchers working at the UCLA Management School decided to study the effects of the UCLA-USC game day parties on UCLA students. 225 UCLA students were randomly sampled (therefore insuring independence) from the registrar's list of enrolled students. Of that 225, 121 students reported that they had attended a football party, 43 did not attend a party but watched the football game on television at home. The remainder did not attend a party or watch the game on television. The change in financial assets experienced by all the UCLA students in the sample had a mean of –18% with a standard deviation of 8%. Among the party attending UCLA students, 71% reported getting "drunk", only 4% of the non-party going UCLA students reported getting "drunk".

$$\begin{array}{r} 225 \\ -121 \\ -43 \\ \hline 61 \end{array}$$

a) Is it allowable to construct a 99% confidence interval for the population percentage of non-party going UCLA students who got drunk on the UCLA-USC game day. (circle one) (1 point)

YES NO (+1) sample isn't large enough.

If you circled YES, please construct a 99% confidence interval in the space below. If you circled NO, please use the space to explain why it is not allowable to construct a 99% confidence interval. (6 points)

$\hat{p} \pm z^* \sqrt{\frac{\hat{p}\hat{q}}{n}}$ (+6)

$0.04 \pm (2.58)\sqrt{\frac{(0.04)(0.96)}{61}}$

$0.04 \pm (2.58)(0.025)$

4% ± 6.5% ~~the~~ range includes a negative portion. ~~sample~~ isn't large enough.

$np = (61)(0.04) \geq 10$ $nq = (61)(0.96) \geq 10$

$2.44 \geq 10$ $58 \geq 10$

Not true

b) Is it allowable to construct a 99% confidence interval for the population percentage of UCLA students who attended a football party and got drunk on the UCLA-USC game day. (circle one) (1 point)

YES NO (+1)

If you circled YES, please construct a 99% confidence interval in the space below. If you circled NO, please use the space to explain why it is not allowable to construct a 99% confidence interval. (6 points)

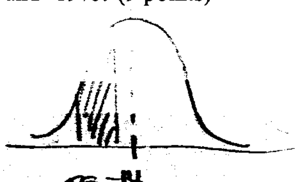
$0.71 \pm (2.58)\sqrt{\frac{(0.71)(0.29)}{121}}$

0.71 ± 0.106

71% ± 10.6%

60.4% to 81.6% (+6)

c) What is the chance that a random sample of size 225 UCLA students will reveal a mean change in financial assets between -15% and -19%? (9 points)



$\mu = -14$

- the true population
- don't relate to sample

$z_{-15} = \frac{-15 - -14}{\frac{0.21}{\sqrt{225}}} = \frac{-.15 + .14}{0.014} = -0.71 \longleftrightarrow 23.89\%$

$z_{-18} = \frac{-.18 + .14}{0.014} = -2.56 \longleftrightarrow 0.52\%$ (+9)

$23.89 - 0.52 = \boxed{23.37\%}$

~~$z_{15} = \frac{-15 - -18}{\frac{0.08}{\sqrt{225}}} = \longleftrightarrow$~~

~~$z_{-18} = \frac{-18 - -18}{\sqrt{}} = 0 \longleftrightarrow 50\%$~~

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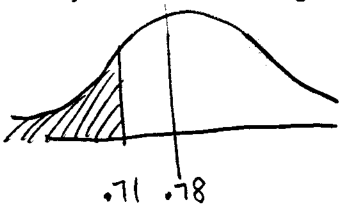
(continued from above)

d) Two years ago, the UCLA Management School conducted a comparable study that showed that for UCLA students who attended parties on the UCLA-USC game day, 78% reported getting "drunk". Please test the hypothesis that UCLA has experienced a decline in the proportion (or percentage) of students who get drunk while attending parties. Clearly state a null hypothesis, an alternative hypothesis, perform a test of significance, clearly state a p-value, tell me if you reject or did not reject the null, and finally give a very brief interpretation of your results while using an alpha level of .05 to make your decision. (20 points)

1) null $H_0: p = .78$ ✓

2) alt $H_1: p < .78$ ✓



3) z-test

$$\frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} \rightarrow \frac{.71 - .78}{\sqrt{\frac{(.78)(.22)}{121}}} = \frac{-0.07}{0.0376587} \rightarrow -1.859$$ ✓

p-value $= 0.0314$ ✓

4) $0.0314 < \alpha\ 0.05$

since the p-value 0.0314 is less than the alpha level 0.05, ✓
we reject the null because the number is statistically significant.
Evidence suggests that the alternative is correct and UCLA has probably experienced a decline in the proportion of students who get drunk while attending parties. ✓

e) True or False and justify your response by identifying your assumptions. If you have worked out a 95% confidence interval for the population proportion using a sample of size 225, and you would like to create a new interval that is one-fourth as wide but still has 95% confidence, you should increase the sample size to 3600. Clearly identify whether you believe this statement to be true or false (1 point for a clear true/false statement, 4 points for the justification) ✓

$$1.96\sqrt{\frac{(.5)(.5)}{225}} = 0.065\overline{3}$$

$$1.96\sqrt{\frac{(.5)(.5)}{3600}} = 0.016\overline{3}$$

sample size 225 has larger marginal error

If we want the interval to be smaller and more precise, we are correct to increase the sample size.

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