HW7

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6.1

a) False. Success-failure condition not met.

b) True. It is not normally distributed due to the failure to meet the success-failure condition. It is right skewed because it is bounded by 0, meaning that far left skew probabilities are not possible and will bunch up more than in the opposite direction.

c) False. Z score is 1.65 which is not enough to be considered an outlier.

d) True. Z score is 2.32 which is enough to be considered an outlier.

e) False. Decreases SE by square root of 1/2 since it's standard error and not variance. It scales by roots.

6.5

a) False. We are 100% certain that 70% of voters in THIS SAMPLE will support Prop 19 since we know the true proportion for this sample.

b) True, unless this is year much different from 2010 (ie 1850).

c) True for the year 2010

d) True, while maintaining everything else as equal

e) True for the year 2010 since the mean proportion is above 50% by a statistically significant amount.

6.8

a) $\sqrt{\frac{(.66*.34)}{1018}} * 1.96 = .029\ .03$

b) No, the confidence intervals at 95% are 63 and 69, meaning that greater than 69 (ie 70) indicates the cutoff region where there is no longer 95% confidence that the proportion is true.

6.10

a) The percentage of the citizens that categorized their poorly enough to be considered "suffering". (.25)

b) This is a random sample from less than 10% of the population so the observations can be assumed to be independent. The success-failure condition is also met since 250 and 750 are both well above 10.

c) $\sqrt{\frac{.25*.75}{1000}} * 1.96 + .25 = (.2231, .2768)$

d) If we were to use a higher confidence interval the interval would expand since it would require a higher z score to multiply the standard error.

e) If we were to use a larger sample the interval would shrink since it would reduce the standard error by a factor of $\frac{1}{\sqrt{n}}$

6.15

a) $H_0 : p = .38, H_A : p \neq .38$ The sample is less than 10% of the population and the success failure conditions are satisfied. Z score is VERY large and p-value is almost 0, meaning that there is almost no chance the null hypothesis is true. This implies that the proportion of US citizens that use their mobile phones to browse the internet is significantly below the proportion of Chinese citizens that use their mobile phones to browse the internet.

b) In this context (for a two tailed test) it represents the probability that the proportion of Chinese citizens that use their mobile phones to browse the internet has almost no chance of being the same as the proportion of US citizens that use their mobile phones to browse the internet.

c) $\sqrt{\frac{.17*.83}{2254}} * 1.96 + / - .17 = (.1544, .1855)$

6.16

a) $H_0 : p = .5, H_A : p < .5$ The sample is less than 10% of the population and the success failure conditions are satisfied. Standard error is $\sqrt{\frac{.48*.52}{331}} = .0274$. Z score is .72. This means that we do not reject the null hypothesis, or that there is not enough data to support the claim that the minority of Americans who chose not to go to college did so due to financial reasons.

b) It should contain .5 because we were not confident that .5 is signficantly than the sample proportion.

6.18

a) The sample size is less than 10% of the population size, and the failures/successes are both above 10. The 90% confidence interval:$.0274 * 1.64 + / - .48 = (.4350, .5249)$. We are 90% confident that between .435 and .5249 of all students who did not go to university did so due to financial reasons

b) $\sqrt{\frac{.48*.52}{n}} = .015/1.64$, $n = 2984$

6.27

a) $\sqrt{\frac{.7*.3}{819} + \frac{.42*.58}{783}} * 1.96 + / - .7 - .42 = (.23, .33)$. We are 95% confident that the porportion of Democrats who support the health care public option plan in 2009 is 23% to 33% higher than the proportion of Independents.

b) True, it is more likely for the Democrat to support it than the Independent

6.29

a) College graduates $= \frac{104}{438} = .2374$. Non college grad $= \frac{131}{389} = .3367$.

b) $H_0 : CG = NCG, H_A : CG \neq NCG$. It is most likely that 389 is less than 10% of the non college grad population and 438 is also less than the 10% of the college grad population. Both proportions also satisfy the failure-success criterion. Standard error is $\sqrt{\frac{.2374*(1-.2374)}{438} + \frac{.3367*(1-.3367)}{389}}$. Z score is -3.18 and p-value is .0014 so we reject the null hypothesis. The data supports the conclusion that proportion of college graduates that are of the opinion that they know enough to have an educated stance on the issue is greater than the proportion of non college graduates (p-value is small enough to imply directionality in a one tailed test).

6.32

a) All assumptions are met. $H_0 : R = D, H_A R \neq D$. Standard error is $\sqrt{\frac{.83*.17}{318} + \frac{.81*.19}{369}} = .0293$. $\frac{.83-.81}{.0293} = .68$. P-value is .24. Do not reject the null hypothesis. The data does not support the conclusion that the proportions are different.

b) Type II error because we would be making the error that despite the null hypothesis being false, we failed to reject it.