Homework Assignment 7

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Question 1 (Exercise 6.19 on Page 225):

a)

False. Because confidence interval only contains positive values.

b)

True.

c)

True.

d)

True.

e)

False. The confidence interval is already calculated and provided in the context.

Question 2 (Exercise 6.20 on Page 226):

a)

False. The significance level of 0.05 is not met with the p-value of 1, so there is no convincing evidence to reject the null hypothesis.

b)

False. The confidence interval is between -0.16 and 0.02, so this does not mean it is 16% more to 2% fewer.

c)

False. Because the 90% confidence interval is narrower than 95% confidence interval.

d)

True.

Question 3 (Exercise 6.22 on Page 226):

n1 = 11545 n2 = 4691 phat1 = 0.08 phat2 = 0.088 significance level = 1-0.95 = 0.05 Z = 1.96 CI = (0.08-0.088)+-1.96* sqrt(0.08*(1-0.08)/11545 + 0.088(1-0.088)/4691) = (-0.0175, 0.0015)

A 95% confidence interval for the difference between the proportions of Californians and Oregonians who are sleep deprived is (-0.0175, 0.0015). We are 95% confident that the difference between the proportions of Californians and Oregonians who are sleep deprived is between 0.0015 and 0.0175.

Question 4 (Exercise 6.24 on Page 226):

a)

n1 = 11545 n2 = 4691 phat1 = 0.08 phat2 = 0.088 HO: phat1 - phat2 = 0 HA: phat1 - phat2 is not equal to 0

check conditions:

n1* phat1 = 11545*0.08 = 923.6 n1* (1-phat1) = 11545* (1-0.08) = 10621.4 n2* phat2 = 4691*0.088 = 412.808 n2* (1-phat2) = 4691* (1-0.088) = 4278.19

Since above are all greater than 10, phat1-phat2 is approximately normal and we can use large sample hypothesis test.

p = (n1 * phat1 + n2*phat2)/(n1+n2) = (923.6+412.808)/(11545+4691) = 0.0823 z = (0.08-0.088)/srqt(0.0823* (1-0.0823)* (1/11545 + 1/4691)) = -1.68 p_value = 2* P(Z<=-1.96) = 2*0.0465 = 0.093 p_value >0.05, fail to reject null hypothesis

There is no sufficient evidence to conclude that the rate of sleep deprivation is different for the two states.

b)

Type II error.

Question 5 (Exercise 6.27 Page 227):

x1 = 35 n1 = 292 phat1 = x1/n1 = 35/292 = 0.1199 x2 = 35 n2 = 203 phat2 = x2/n2 = 35/203 = 0.1724 HO: phat1 - phat2 = 0 HA: phat1 - phat2 is not equal to 0 p = (x1+x2)/(n1+n2)= (35+35)/(292+203)= 0.1414 z = (0.1199-0.1724)/sqrt(0.1414* (1-0.1414)* (1/292+1/203)) = -1.65 p_value = 0.992 p_value >0.05, fail to reject null hypothesis

There is no sufficient evidence to conclude that there is a difference between the proportions of truck drivers and non-transportation workers.

Question 6 (Exercise 6.28 on Page 228):

a)

HO: pvitamin = pnovitamin HA: pvitamin is not equal to pnovitamin

b)

x1 = 143 n1 = 254 pvitamin = 143/254 = 0.563 x2 = 159 n2 = 229 pnovitamin = 159/229 = 0.694 z = (0.563-0.694)/sqrt(0.563* (1-0.563)/254 + 0.694* (1-0.694)/229) = -2.9774 p_value = 0.0029 p_value < 0.05, reject the null hypothesis

There is sufficient evidence to conclude that there is a difference in the proportion of the use of prenatal vitamins during the three months before pregnancy and autism.

c)

It is a appropriate title since vitamins might help to prevent autism statistically.

Alternative title: Prenatal vitamins could help to prevent autism.

Question 7 (Exercise 6.29 on Page 228):

a)

```
results <- matrix(c(26,94,120,10,110,120,36,204,240),ncol=3,byrow=TRUE)
colnames(results) <- c("Yes","No","Total")
rownames(results) <- c("Nevaripine","Lopinavir","Total")
results <- as.table(results)
results
```

```
##            Yes  No Total
## Nevaripine  26  94   120
## Lopinavir   10 110   120
## Total       36 204   240
```

b)

HO: p1 = p2 HA: p1 is not equal to p2

c)

```
# Data
failures <- c(26, 10)
total <- c(120, 120)

# Proportions
prop_failures <- failures / total
```

```r
# Two-sample z-test for proportions
test_result <- prop.test(failures, total, alternative = "two.sided")

# Print the test result
print(test_result)
```

```
##
##  2-sample test for equality of proportions with continuity correction
##
## data:  failures out of total
## X-squared = 7.3529, df = 1, p-value = 0.006695
## alternative hypothesis: two.sided
## 95 percent confidence interval:
##  0.03623882 0.23042785
## sample estimates:
##     prop 1     prop 2
## 0.21666667 0.08333333
```

p_value <0.05, reject null hypothesis

There is sufficient evidence to conclude that there is difference in virologic failure rates between treatment groups.