Stat 204 *Exam 2* *Name:*

All statements should be expressed in complete sentences, and every numerical answer should be justified by showing how it was obtained. Writing R code that will actually calculate the numerical answer is definitely encouraged, followed by displaying the numerical answer your code returns. Recall that the point of this exam is to demonstrate your mastery of complete analytic processes.

I pledge that I have neither given nor received unauthorized aid on this exam. Pledged: .....

For a CI for one proportion:

- Define $p, \hat{p}, n$
- State α
- Calculate $\hat{p}, n, point.estimate, z^*, SE, CI$
- Sketch the CI
- State the conclusion in context.

For an HT for one proportion:

- Define $p, \hat{p}, n$
- State H_0, H_a and α
- Calculate $p, \hat{p}, n, SE$, the test statistic z, and the P-value $p.value$
- On a sketch of the normal probability distribution, locate z and shade the region whose area is $p.value$
- State the formal conclusion of the HT and explain how you reached that conclusion
- State the conclusion in context.

For a CI for the difference of two proportions:

- Define $p_1, p_2, \hat{p}_1, n_1, \hat{p}_2, n_2$
- State α
- Calculate $\hat{p}_1, n_1, \hat{p}_2, n_2, point.estimate, z^*, SE, CI$
- Sketch the CI
- State the conclusion in context.

For an HT for the difference of two proportions:

- Define $p_1, p_2, \hat{p}_1, n_1, \hat{p}_2, n_2$
- State H_0, H_a and α
- Calculate $\hat{p}_1, n_1, \hat{p}_2, n_2$, the point estimate $point.estimate$, SE, the test statistic z, and the P-value $p.value$
- On a sketch of the normal probability distribution, locate z and shade the region whose area is $p.value$
- State the formal conclusion of the HT and explain how you reached that conclusion
- State the conclusion in context.

cell phones

1. (Peck, 1/e, 11.20) *The Insurance Institute for Highway Safety issued a news release titled "Teen Drivers often Ignoring Bans on Using Cell Phones" (June 9, 2008). The following quote is from the news release: Just 1–2 months prior to the ban's Dec. 1, 2006, start, 11% of teen drivers were observed using cell phones as they left school in the afternoon. About 5 months after the ban took effect, 12% of teen drivers were observed using cell phones. Suppose that the two samples of teen drivers (before the ban, after the ban) are representative of these populations of teen drivers. Suppose also that 200 teen drivers were observed before the ban (so* $n_1 = 200$ *and* $\hat{p}_1 = 0.11$*) and that 150 teen drivers were observed after the ban.*

   a. *Construct and interpret a 95% large-sample confidence interval for the difference in the proportion using a cell phone while driving before the ban and the proportion after the ban.*

   b. *Is zero included in the confidence interval of Part (a)? What does this imply about the difference in the population proportions?*

[1] Peck, Roxy (2014-01-01). Statistics: Learning from Data (with JMP Printed Access Card) (Page 479). Cengage Learning. Kindle Edition.

For a CI for the difference of two proportions:

- Define $p_1, p_2, \hat{p}_1, n_1, \hat{p}_2, n_2$

- State α

- Calculate $\hat{p}_1, n_1, \hat{p}_2, n_2$

```
#  p1.hat

#  n1

#  p2.hat

#  n2

#
```

- Calculate $point.estimate, z^*, SE, CI$

```
#  point.estimate




#  z.star




#  se
#  var1 <- p1.hat * (1 - p1.hat) / n1
#  var2 <- p2.hat * (1 - p2.hat) / n2
#  se <- sqrt(var1 + var2)



#  ci




#
```

- Sketch the CI

- State the conclusion in context. Mention the confidence level.

- b. *Is zero included in the confidence interval of Part (a)? What does this imply about the difference in the population proportions?*

music

2. (Peck, 1/e, 11.22) *The authors of the paper "Adolescents and MP3 Players: Too Many Risks, Too Few Precautions" (Pediatrics [2009]: e953–e958) concluded that more boys than girls listen to music at high volumes. This conclusion was based on data from independent random samples of 764 Dutch boys and 748 Dutch girls ages 12 to 19. Of the boys, 397 reported that they almost always listen to music at a high volume setting. Of the girls, 331 reported listening to music at a high volume setting. Do the sample data support the authors' conclusion that the proportion of Dutch boys who listen to music at high volume is greater than this proportion for Dutch girls? Test the relevant hypotheses using a 0.01 significance level.*

[1] Peck, Roxy (2014-01-01). Statistics: Learning from Data (with JMP Printed Access Card) (Page 479). Cengage Learning. Kindle Edition. _ [1]

- Define $p_1, p_2, \hat{p}_1, n_1, \hat{p}_2, n_2$

- State H_0, H_a and α

- Calculate $\hat{p}_1, n_1, \hat{p}_2, n_2$

```
#  p1.hat


#  n1


#  p2.hat


#  n2


#
```

- Calculate the point estimate *point.estimate*, SE, the test statistic z, and the P-value *p.value*

```
#  point.estimate




#  se
#  p.c <- (p1.hat * n1 + p2.hat * n2) / (n1 + n2)    # combined estimate
#  se <- sqrt(p.c * (1 - p.c) * (1 / n1 + 1 / n2))



#  z




#  p.value




#
```

- On a sketch of the normal probability distribution, locate z and shade the region whose area is *p.value*

- State the formal conclusion of the HT and explain how you reached that conclusion.

- State the conclusion in context. Mention the confidence level.