Chapter 10 HW

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10.14 a) Would it be appropriate to use a normal approximation in conducting a statistical test of the research hypothesis that over half of persons suffering from chonic pain are over 50 years of age?

```
(424/800)*(800) > 5
```

```
## [1] TRUE
```

```
(376/800)*(800) > 5
```

```
## [1] TRUE
```

Yes, it is appropriate.

b)Using the data in the survey, is there substantial evidence ($\alpha = 0.05$) that more than half of persons suffering from chronic pain are over 50 years of age?

```
old <- prop.test(x = 484, n = 800, p = 0.5, alternative =  "greater", correct = FALSE)
old
```

```
##
##  1-sample proportions test without continuity correction
##
## data:  484 out of 800, null probability 0.5
## X-squared = 35.28, df = 1, p-value = 1.428e-09
## alternative hypothesis: true p is greater than 0.5
## 95 percent confidence interval:
##  0.576263 1.000000
## sample estimates:
##     p
## 0.605
```

c) Place a 95% confidence interval on the proportion of person suffering from chronic pain that are over 50 years of age.

```
0.605 - 1.96*(sqrt(0.605*0.395/800))
```

```
## [1] 0.5711244
```

```
0.605 + 1.96*(sqrt(0.605*0.395/800))
```

```
## [1] 0.6388756
```

10.18 a) Place a 95% confidence interval on p1-p2, the difference in the proportions of customers purchasing lawnmowers with and without the warranty.

```
mower <- prop.test(x = c(10, 4), n = c(25, 25), alternative = "two.sided",
                   correct = FALSE)
mower$conf.int
```

```
## [1] 0.0001465295 0.4798534705
## attr(,"conf.level")
## [1] 0.95
```

b) Test the research hypothesis that offering the warranty will increase the proportion of customers who will purchase a mower. Use $\alpha = 0.05$.

```
mower.test <- prop.test(x = c(10,4), n = c(25,25), alternative = "greater",
                        correct = TRUE)
mower.test
```

```
##
##  2-sample test for equality of proportions with continuity
##  correction
##
## data:  c(10, 4) out of c(25, 25)
## X-squared = 2.4802, df = 1, p-value = 0.05765
## alternative hypothesis: greater
## 95 percent confidence interval:
##  -0.001291378  1.000000000
## sample estimates:
## prop 1 prop 2
##   0.40   0.16
```

c) Are the conditions for using a large-sample test to answer the question in part b) satisfied? If not, apply an exact procedue.

```
0.4*25 > 5
```

```
## [1] TRUE
```

```
0.6*25 > 5
```

```
## [1] TRUE
```

```
0.16*25 > 5
```

```
## [1] FALSE
```

```
0.84*25 > 5
```

```
## [1] TRUE
```

```
x <- matrix(c(10, 4, 15, 21), byrow = FALSE, nrow = 2, ncol = 2)
fisher.test(x, alternative = "greater")
```

```
##
##  Fisher's Exact Test for Count Data
##
## data:  x
## p-value = 0.05683
## alternative hypothesis: true odds ratio is greater than 1
## 95 percent confidence interval:
##  0.9619875       Inf
## sample estimates:
## odds ratio
##     3.4113
```

d) Based on your results from parts a) and b), should the dealer offer the warranty? The dealer should not offer the warranty. The test stat isn't statistically significant at alpha = 0.05.

10.42 (b,d) b) Is the promotion decision for the fireman related to the age of the fireman? Use $\alpha = 0.05$.

```
promote <- matrix(c(9, 41, 29, 39, 34, 46, 12, 38), nrow = 2, ncol = 4)
promote
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    9   29   34   12
## [2,]   41   39   46   38
```

```
promote_chi <- chisq.test(x = promote)
promote_chi
```

```
##
##  Pearson's Chi-squared test
##
## data:  promote
## X-squared = 12.796, df = 3, p-value = 0.0051
```

d) What are some other variables, besides age that needed to be addressed in an age discrimination analysis?
I believe sex/gender, years with the department, and number of previous promotions are adequate variables to split this data on.

10.43 a) Is the age of the fireman related to whether or not the fireman is promoted? Use $\alpha = 0.05$.

```
new_promote <- matrix(c(38, 80, 46, 84), nrow = 2, ncol = 2)

chi_promote <- chisq.test(x = new_promote, correct = )
chi_promote
```

```
##
##  Pearson's Chi-squared test with Yates' continuity correction
##
## data:  new_promote
## X-squared = 0.15549, df = 1, p-value = 0.6933
```

b) Is your conclusion concerning age discrimination different from your conclusion using the data in Exercise 10.42?
Yes, with a p-value greater than 0.05, it does not appear that the age group is different for promotion potential. However, I am suspect of lumping everyone into one group that is below 40 years of age.