hw3

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1/31/2022

4.1

In both cases the treatment and control are statistically significant with p-value = 0.005.

```
library(asaur)
library(survival)
phs = asaur::pharmacoSmoking

# Log Rank Test
survdiff(Surv(ttr, relapse) ~ grp, rho = 0, data = phs)
```

```
## Call:
## survdiff(formula = Surv(ttr, relapse) ~ grp, data = phs, rho = 0)
##
##                   N Observed Expected (O-E)^2/E (O-E)^2/V
## grp=combination 61       37     49.9      3.36      8.03
## grp=patchOnly   64       52     39.1      4.29      8.03
##
##  Chisq= 8  on 1 degrees of freedom, p= 0.005
```

```
# Prentice Modification
survdiff(Surv(ttr, relapse) ~ grp, rho = 1, data = phs)
```

```
## Call:
## survdiff(formula = Surv(ttr, relapse) ~ grp, data = phs, rho = 1)
##
##                   N Observed Expected (O-E)^2/E (O-E)^2/V
## grp=combination 61     23.1     32.1      2.53      8.01
## grp=patchOnly   64     35.8     26.8      3.04      8.01
##
##  Chisq= 8  on 1 degrees of freedom, p= 0.005
```

4.2

Stratifying on employment status we again get the the treatment and control groups are statistically significant.

```r
# Log Rank Test
survdiff(Surv(ttr, relapse) ~ grp + strata(employment), rho = 0, data = phs)
```

```
## Call:
## survdiff(formula = Surv(ttr, relapse) ~ grp + strata(employment),
##     data = phs, rho = 0)
##
##                  N Observed Expected (O-E)^2/E (O-E)^2/V
## grp=combination 61       37     50.3      3.50      8.58
## grp=patchOnly   64       52     38.7      4.54      8.58
##
##  Chisq= 8.6  on 1 degrees of freedom, p= 0.003
```

```r
# Prentice Modification
survdiff(Surv(ttr, relapse) ~ grp + strata(employment), rho = 1, data = phs)
```

```
## Call:
## survdiff(formula = Surv(ttr, relapse) ~ grp + strata(employment),
##     data = phs, rho = 1)
##
##                  N Observed Expected (O-E)^2/E (O-E)^2/V
## grp=combination 61     23.3     32.4      2.53         8
## grp=patchOnly   64     35.9     26.9      3.05         8
##
##  Chisq= 8  on 1 degrees of freedom, p= 0.005
```

4.3

All the p-values for the tests are less than 0.05 so we conclude the survival times of the 2 groups are not equal.

```r
pan = asaur::pancreatic
head(pan)
```

```
##   stage    onstudy progression      death
## 1     M 12/16/2005    2/2/2006 10/19/2006
## 2     M   1/6/2006   2/26/2006  4/19/2006
## 3    LA   2/3/2006    8/2/2006  1/19/2007
## 4     M  3/30/2006           .  5/11/2006
## 5    LA  4/27/2006   3/11/2007  5/29/2007
## 6     M   5/7/2006   6/25/2006 10/11/2006
```

```r
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

```
## The following objects are masked from 'package:base':
##
##     date, intersect, setdiff, union
```

```r
pan$death = as.Date(as.character(pan$death), format = "%m/%d/%Y")

# Log Rank Test
survdiff(Surv(as.numeric(death)) ~ stage, rho = 0, data = pan)
```

```
## Call:
## survdiff(formula = Surv(as.numeric(death)) ~ stage, data = pan,
##     rho = 0)
##
##           N Observed Expected (O-E)^2/E (O-E)^2/V
## stage=LA  8        8     3.43     6.073      7.15
## stage=M  33       33    37.57     0.555      7.15
##
##  Chisq= 7.2  on 1 degrees of freedom, p= 0.007
```

```r
# Prentice Modification
survdiff(Surv(as.numeric(death)) ~ stage, rho = 1, data = pan)
```

```
## Call:
## survdiff(formula = Surv(as.numeric(death)) ~ stage, data = pan,
##     rho = 1)
##
##           N Observed Expected (O-E)^2/E (O-E)^2/V
## stage=LA  8     5.59     2.61     3.393      5.11
## stage=M  33    15.41    18.39     0.481      5.11
##
##  Chisq= 5.1  on 1 degrees of freedom, p= 0.02
```

```r
# Log rank test
wilcox.test(as.numeric(death) ~ stage, data = pan)
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  as.numeric(death) by stage
## W = 71, p-value = 0.04504
## alternative hypothesis: true location shift is not equal to 0
```