SOLUTION ASAUR Exercise 4.1

It is assumed below that what ASAUR calls the "Prentice modification of the Gehan test" corresponds to putting rho=1 in survdiff.

This will presumably correspond to the Harrington-Fleming weight in Table 3.2 (p. 8/32 in Slides 10), and leads to having K(t) = \hat S(t-) in the test statistic Z_1 on p. 10/32 in Slides 10.

Below is an R-session as asked for in the exercise. Both the case rho=1 and the ordinary logrank test are applied to the data. The resulting p-values are, however, approximately the same, so the stratification on employment seems to be unnecessary here.

Regarding the difference in outputs, note that since S(t) < or = 1, this will lead to lower values for "observed" and "expected" when compared to the standard case without rho=1 (see the expressions on p. 10/32 in Slides 10 and recall that K(t) < 1 for most t here).

R-SESSION:

```
> library(asaur)
> attach (pharmacoSmoking)
> head(pharmocoSmoking)
   id ttr relapse         grp age gender     race employment
yearsSmoking
1  21 182       0   patchOnly  36   Male    white         ft
    26
2 113  14       1   patchOnly  41   Male    white      other
    27
3  39   5       1 combination  25 Female    white      other
    12
4  80  16       1 combination  54   Male    white         ft
    39
5  87   0       1 combination  45   Male    white      other
    30
6  29 182       0 combination  43   Male hispanic         ft
    30
  levelSmoking ageGroup2 ageGroup4 priorAttempts longestNoSmoke
1        heavy     21-49     35-49             0             0
2        heavy     21-49     35-49             3            90
3        heavy     21-49     21-34             3            21
4        heavy       50+     50-64             0             0
5        heavy     21-49     35-49             0             0
6        heavy     21-49     35-49             2          1825


> survdiff(Surv(ttr, relapse) ~ grp,rho=1)
Call:
survdiff(formula = Surv(ttr, relapse) ~ grp, 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
> survdiff(Surv(ttr, relapse) ~ grp)
Call:
survdiff(formula = Surv(ttr, relapse) ~ grp)

                 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
```

SOLUTION ASAUR Exercise 4.2

This is similar to what is done in ASAUR p. 50.

```
> survdiff(Surv(ttr, relapse) ~ grp + strata(employment))
Call:
survdiff(formula = Surv(ttr, relapse) ~ grp + strata(employment))

                 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
```