Answers to Exercises Basic CFA

```
library("lavaan")
```

Exercise 3.1

```
Health.cov <- lav_matrix_lower2full(c(
  0.77,
  0.38, 0.65,
  0.39, 0.39, 0.62,
 -0.25,-0.32,-0.27, 6.09,
  0.31, 0.29, 0.26,-0.36, 7.67,
  0.24, 0.25, 0.19,-0.18, 0.51, 1.69,
 -3.16,-3.56,-2.63, 6.09,-3.12,-4.58,204.79,
 -0.92,-0.88,-0.72, 0.88,-1.49,-1.41, 16.53, 7.24
))
rownames(Health.cov) <- colnames(Health.cov) <-
  c("Dep1","Dep2","Dep3", "SocAct", "Falls", "ChronCond",
    "PhysAct", "PersMob")
```

a)

```
mod <- '
  F =~ Dep1 + Dep2 + Dep3 + SocAct
'
marker.fit <- cfa(mod, sample.cov = Health.cov, sample.nobs = 6053)
summary(marker.fit, standardized = TRUE)
```

```
## lavaan 0.6-5 ended normally after 27 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of free parameters                          8
##
##   Number of observations                          6053
##
## Model Test User Model:
##
##   Test statistic                                 9.620
##   Degrees of freedom                                 2
##   P-value (Chi-square)                           0.008
##
## Parameter Estimates:
##
##   Information                                 Expected
##   Information saturated (h1) model          Structured
##   Standard errors                             Standard
##
```

```
## Latent Variables:
##                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##   F =~
##     Dep1             1.000                               0.616    0.701
##     Dep2             1.005    0.021   47.588    0.000    0.619    0.768
##     Dep3             1.025    0.022   47.638    0.000    0.631    0.801
##     SocAct          -0.736    0.058  -12.793    0.000   -0.453   -0.184
##
## Variances:
##                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##    .Dep1             0.391    0.009   41.276    0.000    0.391    0.508
##    .Dep2             0.267    0.008   33.581    0.000    0.267    0.411
##    .Dep3             0.222    0.008   28.886    0.000    0.222    0.358
##    .SocAct           5.884    0.108   54.559    0.000    5.884    0.966
##     F                0.379    0.014   27.888    0.000    1.000    1.000
```

```
stdLV.fit <- cfa(mod, sample.cov = Health.cov, sample.nobs = 6053, std.lv=TRUE)
summary(stdLV.fit, standardized = TRUE)
```

```
## lavaan 0.6-5 ended normally after 19 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of free parameters                          8
##
##   Number of observations                          6053
##
## Model Test User Model:
##
##   Test statistic                                 9.620
##   Degrees of freedom                                 2
##   P-value (Chi-square)                           0.008
##
## Parameter Estimates:
##
##   Information                                 Expected
##   Information saturated (h1) model          Structured
##   Standard errors                             Standard
##
## Latent Variables:
##                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##   F =~
##     Dep1             0.616    0.011   55.776    0.000    0.616    0.701
##     Dep2             0.619    0.010   61.392    0.000    0.619    0.768
##     Dep3             0.631    0.010   64.285    0.000    0.631    0.801
##     SocAct          -0.453    0.035  -12.967    0.000   -0.453   -0.184
##
## Variances:
##                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##    .Dep1             0.391    0.009   41.276    0.000    0.391    0.508
##    .Dep2             0.267    0.008   33.581    0.000    0.267    0.411
##    .Dep3             0.222    0.008   28.886    0.000    0.222    0.358
##    .SocAct           5.884    0.108   54.559    0.000    5.884    0.966
##     F                1.000                               1.000    1.000
```

Both identification methods yield the exact same chi-square value and degrees of freedom.

b) The authors decided to measure poor psychosocial health by means of three depression items and a measure of social activities. However, it seems that social activities is not strongly associated with the latent factor (and with the three depression items, according to the covariance matrix), so one may wonder whether these four items provide a valid model for measuring psychosocial health.