Multivariate Analysis for the Behavioral Sciences, Second Edition (Chapman and Hall/CRC, 2019)
Solutions to Exercises of Chapter 12: Multivariate Data and Multivariate Analysis

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Solutions

Exercise 12.3

Source of the data: Keyfitz, N. and Flieger, W. (1971). *Population: The Facts and Methods of Demography.* W. H. Freeman, San Francisco, California.

```r
life71 <- structure(list(

  m0 = c(63, 34, 38, 59, 56, 62, 50, 65, 56, 69, 65, 64, 56, 60, 61, 49,
         59, 63, 59, 65, 65, 64, 64, 67, 61, 68, 67, 65, 59, 58, 57),
  m25 = c(51, 29, 30, 42, 38, 44, 39, 44, 46, 47, 48, 50, 44, 44, 45, 40,
          42, 44, 44, 48, 48, 63, 43, 45, 40, 46, 45, 46, 43, 44, 46),
  m50 = c(30, 13, 17, 20, 18, 24, 20, 22, 24, 24, 26, 28, 25, 22, 22, 22,
          22, 23, 24, 28, 26, 21, 21, 23, 21, 23, 23, 24, 23, 24, 28),
  m75 = c(13, 5, 7, 6, 7, 7, 7, 7, 11, 8, 9, 11, 10, 6, 8, 9, 6, 8, 8, 14,
          9, 7, 6, 8, 10, 8, 8, 9, 10, 9, 9),

  w0 = c(67, 38, 38, 64, 62, 69, 55, 72, 63, 75, 68, 66, 61, 65, 65, 51,
         61, 67, 63, 68, 67, 68, 68, 74, 67, 75, 74, 71, 66, 62, 60),
  w25 = c(54, 32, 34, 46, 46, 50, 43, 50, 54, 53, 50, 51, 48, 45, 49, 41, 43,
          48, 46, 51, 49, 47, 47, 51, 46, 52, 51, 51, 49, 47, 49),
  w50 = c(34, 17, 20, 25, 25, 28, 23, 27, 33, 29, 27, 29, 27, 25, 27, 23, 22,
          26, 25, 29, 27, 25, 24, 28, 25, 29, 28, 28, 27, 25, 28),
  w75 = c(15, 6, 7, 8, 10, 14, 8, 9, 19, 10, 10, 11, 12, 9, 10, 8, 7, 9, 8,
          13, 10, 9, 8, 10, 11, 10, 10, 10, 12, 10, 11)),

  class = "data.frame",

  .Names = c("m0", "m25", "m50", "m75", "w0", "w25", "w50", "w75"),

  row.names = c("Algeria", "Cameroon", "Madagascar", "Mauritius", "Reunion",
                "Seychelles", "South Africa(C)", "South Africa(W)", "Tunisia",
                "Canada", "Costa Rica", "Dominican Rep", "El Salvador", "Greenland",
                "Grenada", "Guatemala", "Honduras", "Jamaica", "Mexico", "Nicaragua",
                "Panama", "Trinidad(62)", "Trinidad (67)", "United States (66)",
                "United States (NW66)", "United States (W66)", "United States (67)",
                "Argentina", "Chile", "Columbia", "Ecuador"))

head(life71, n = 12)
```

```
##                    m0 m25 m50 m75 w0 w25 w50 w75
## Algeria           63  51  30  13 67  54  34  15
## Cameroon          34  29  13   5 38  32  17   6
## Madagascar        38  30  17   7 38  34  20   7
## Mauritius         59  42  20   6 64  46  25   8
## Reunion           56  38  18   7 62  46  25  10
## Seychelles        62  44  24   7 69  50  28  14
## South Africa(C)   50  39  20   7 55  43  23   8
## South Africa(W)   65  44  22   7 72  50  27   9
## Tunisia           56  46  24  11 63  54  33  19
## Canada            69  47  24   8 75  53  29  10
## Costa Rica        65  48  26   9 68  50  27  10
## Dominican Rep     64  50  28  11 66  51  29  11
```

```r
tail(life71, n = 12)
```

```
##                        m0 m25 m50 m75 w0 w25 w50 w75
## Nicaragua              65  48  28  14 68  51  29  13
## Panama                 65  48  26   9 67  49  27  10
## Trinidad(62)           64  63  21   7 68  47  25   9
## Trinidad (67)          64  43  21   6 68  47  24   8
## United States (66)     67  45  23   8 74  51  28  10
## United States (NW66)   61  40  21  10 67  46  25  11
## United States (W66)    68  46  23   8 75  52  29  10
## United States (67)     67  45  23   8 74  51  28  10
## Argentina              65  46  24   9 71  51  28  10
## Chile                  59  43  23  10 66  49  27  12
## Columbia               58  44  24   9 62  47  25  10
## Ecuador                57  46  28   9 60  49  28  11
```

```r
# get summary statistics for men and for women
Rmen <- cor(life71[, 1:4])
Smen <- var(life71[, 1:4])
mean_men <- apply(life71[, 1:4], 2, mean)

Rwomen <- cor(life71[,5:8])
Swomen <- var(life71[,5:8])
mean_women <- apply(life71[, 5:8], 2, mean)
```
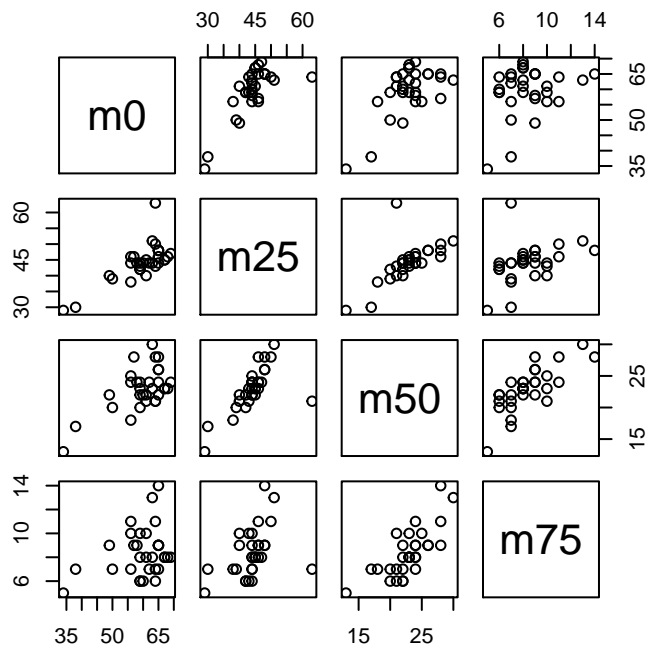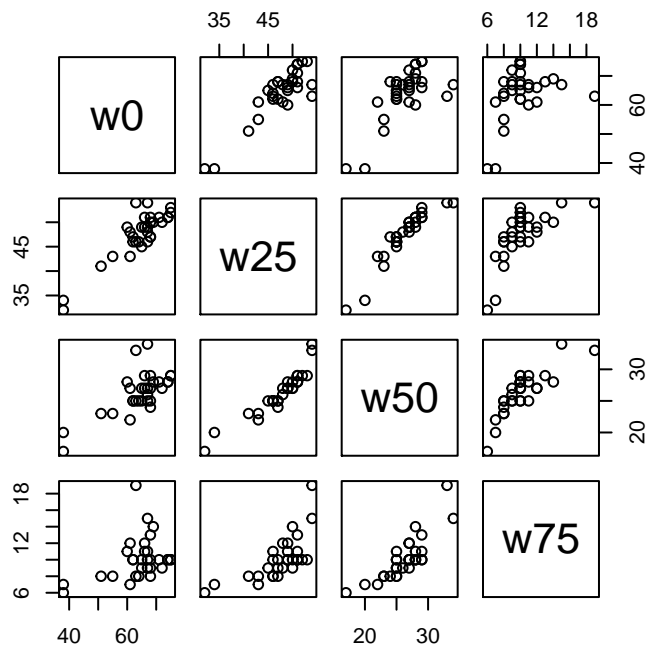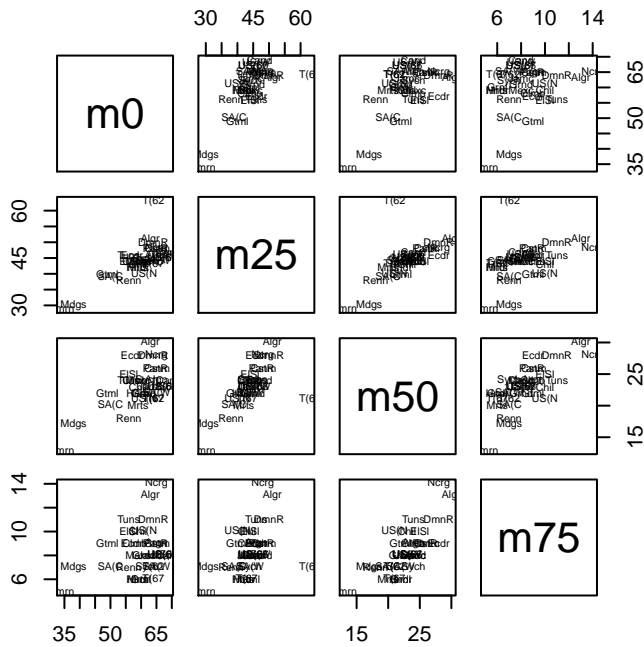
```
pairs(life71[, 1:4])
```
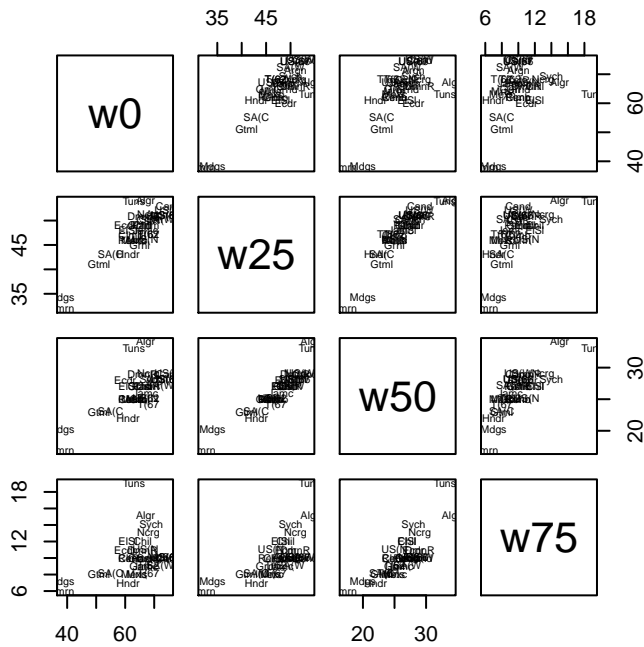


```
pairs(life71[, 5:8])
```

```
pairs(life71[, 1:4], panel = function(x,y) text(x, y, abbreviate(row.names(life71)), cex=0.5))
```
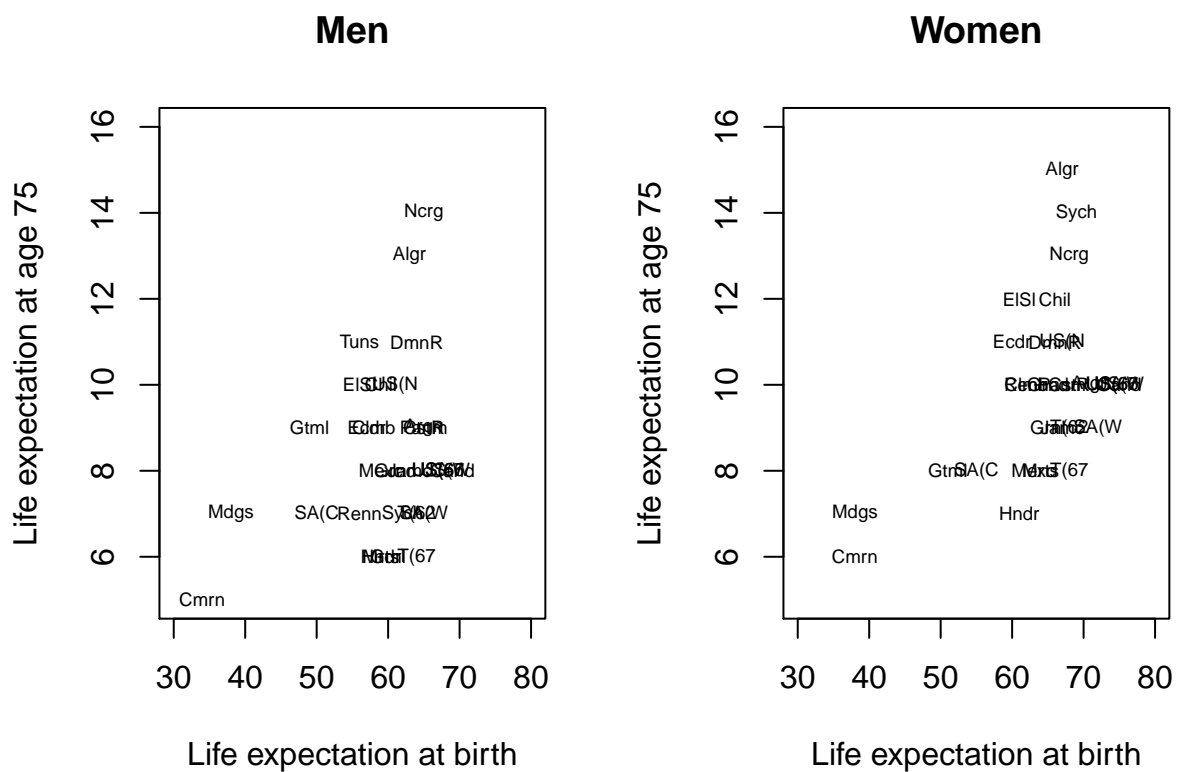


```
pairs(life71[, 5:8], panel = function(x,y) text(x, y, abbreviate(row.names(life71)), cex=0.5))
```

```
attach(life71)
par(mfrow = c(1,2))
plot(m0, m75, xlab = "Life expectation at birth",
     ylab = "Life expectation at age 75", type = "n", ylim = c(5, 16), xlim = c(30, 80))
text(m0, m75, abbreviate(row.names(life71)), cex=0.6)
title("Men")

plot(w0, w75, xlab = "Life expectation at birth",
     ylab = "Life expectation at age 75", type = "n", ylim = c(5, 16), xlim = c(30, 80))
text(w0, w75, abbreviate(row.names(life71)), cex=0.6)

title("Women")
```



```
detach(life71)
```