Kinship and pedigree analysis: Methods and applications

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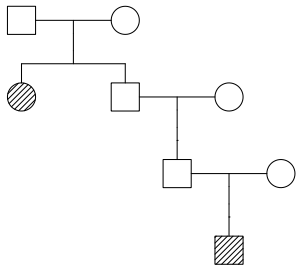
Solutions for exercise set I

Note: QuickPed usually gives the quickest solution for these exercises. R code is provided here.

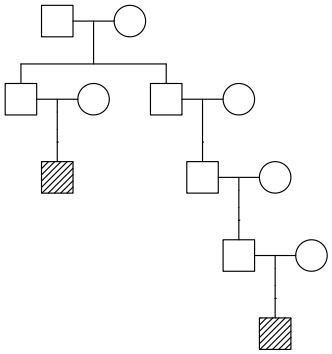
```
library(pedsuite)
```

Exercise I-1

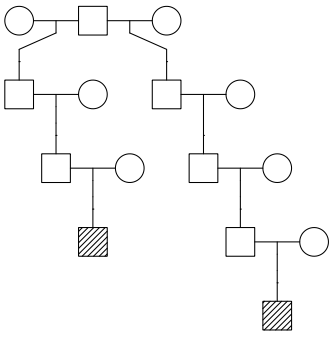
a) Grandaunt – grandnephew:



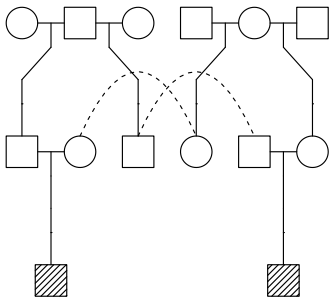
b) First cousins twice removed:



c) Half second cousins once removed:



d) Double half first cousins:



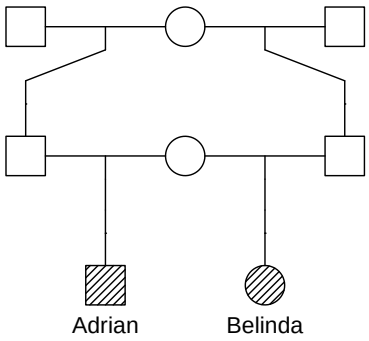
Exercise I-2

a) (Omitted)

b) Adrian and Belinda are simultaneous half siblings and half first cousins.

c) Solution in R:

```
x = halfSibStack(2) |>  swapSex(8)
plot(x, hatched = leaves, labs = c(Adrian = 7, Belinda = 8))
```



d) No, there is no inbreeding in this pedigree.

Exercise I-3

Here is a way to recreate the pedigree in R:

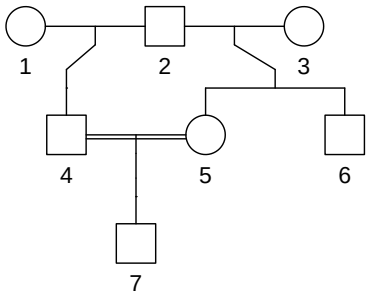
```
# Pedigree
x = cousinPed(1, symmetric = TRUE) |>
  relabel(old = 7:8, new = c("child1", "child2")) |>
  setSex(c("child1", "child2"), sex = 0)

# Plot
plot(x,
     carrier = c("4", "5"),
     deceased = c("1", "2"),
     fill = c(child1 = "7", child2 = "7"),
     textAnnot = list(topright = list(c(child1 = "2017", child2 = "2020"),
                                      font = 2, col = "blue")))
```

Exercise I-4

a) Solution in R:

```
x = halfSibPed(nch1 = 1, nch2 = 2, sex1 = 1, sex2 = 2:1) |>
  addSon(4:5)
plot(x)
```



b) 6 is both an uncle and half-uncle of 7. In R, this can be verified using the `verbalise` function:

```
verbalise(x)
```

```
## Avuncular: 6 is an uncle of 7
##    6-[2,3]-5-7
## Half-avuncular: 6 is a half-uncle of 7
##    6-[2]-4-7
```

c) (Omitted)

Exercise I-5

Omitted; the answer is given in the exercise.

Exercise I-6

Quadruple first cousins!

```
x = nuclearPed(4, sex = c(1,2,1,2)) |>
  addSon(3:4) |>
  addDaughter(5:6)

plot(x, hatched = 7:8)

verbalise(x, 7:8)
```

```
## Quadruple first cousins
##    7-3-[1,2]-5-8
##    7-3-[1,2]-6-8
##    7-4-[1,2]-5-8
##    7-4-[1,2]-6-8
```