Statistical methods in genetic relatedness and pedigree analysis

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Exercise set IX. Genealogical triangulation

Exercise IX-1

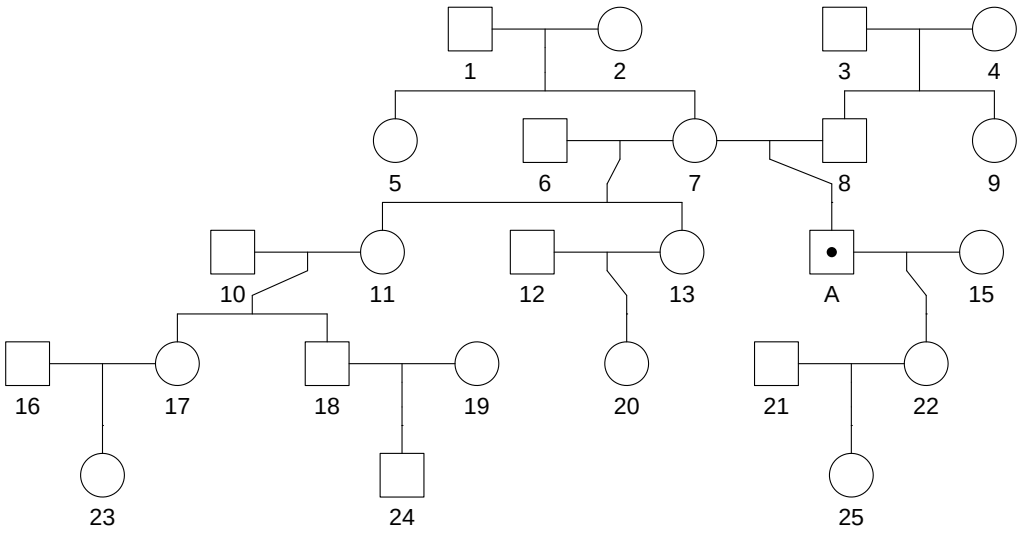
It is reported that two individuals share IBD segments with the following lengths (cM):

8, 13, 15, 19, 19, 20, 21, 24, 24, 25, 25, 26, 28, 29, 31, 33, 35, 45, 49, 61.

a) Use the **ibdClassifier** app (https://magnusdv.shinyapps.io/ibdClassifier/) to estimate the relationship. What are the 3 most likely pedigrees? What is the difference between the first and second?
b) What are the three most likely *types* of relationship, and their posterior probabilities?
c) What is the most likely kinship coefficient? How confident are we in this estimate?
d) It is brought to light that the data is *masked*: only segments longer than 7 cM were reported. Rerun the classification taking this into account. How do the results change?

Exercise IX-2

The police are looking for a female assassin, Ms. X. After submitting her DNA profile, recovered from a crime scene, to an GEDmatch they get a hit to a person A. After some research, the police comes up with this family tree for A:



a) The report states that Ms. X most likely has a H/U/G relationship with A, or possibly one step further. Indicate on the pedigree everyone who matches this information.

b) From a second company the police obtain a hit, to individual 24. He is reported to share 24 IBD segments with Ms. X, with the following lengths:

37, 59, 29, 51, 23, 15, 28, 7, 20, 10, 13, 23, 19, 43, 36, 25, 7, 37, 7, 40, 34, 13, 7, 12.

Use **ibdClassifier** to estimate the relationship. *Note*: The company uses a length cutoff of 7 cM.

c) Who is Ms. X?