Livestock Breeding and Genomics - Exercise 7

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Problem 1: Numerator Relationship Matrix

The following pedigree is given

Calf	Sire	Dam
1	NA	NA
2	NA	NA
3	NA	NA
4	1	2
5	3	2
6	4	5

The pedigree can be read from the file

```
## https://charlotte-ngs.github.io/lbgfs2022/data/ped_num_rel_mat.csv
```

Compute the numerator relationship matrix A for the given pedigree. Recall from the course notes that elements of matrix A are computed differently for elements on the diagonal and for off-diagonal elements. In summary, we compute

- diagonal element $(A)_{ii}$ as $(A)_{ii} = 1 + F_i$ where $F_i = 0.5 * (A)_{sd}$ where s and d are parents of i.
- off-diagonal element $(A)_{ki}$ as $(A)_{ki} = 0.5 * [(A)_{ks} + (A)_{kd}]$ where s and d are parents of i

Task

Use two nested loops over the rows and the columns of matrix A to compute all the elements of matrix A using the formulas given above.

Problem 2: Verification

Use the function `pedigreemm::getA()` from package `pedigreemm` to verify your result from problem 1.

Problem 3