Livestock Breeding and Genomics - Exercise 7

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Problem 1: Own Performance

Given is the dataset with weight observations for 12 animals. The heritability (h^2) for the trait is 0.2025. The population mean μ can assumed to be the mean of the weights in the table below.

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Animal	Weight
1	285
2	282
3	278
4	280
5	281
6	282
7	285
8	282
9	281
10	287
11	281
12	282

The data in the above table can be read from

```
## https://charlotte-ngs.github.io/lbgfs2023/data/lbg_ex07_p1_own_perf.csv
```

Your Tasks

- Compute the breeding values for all animals given in the table above
- Compute the accuracies of the breeding values of all animals shown in the table above.

Problem 2: Breeding Value Prediction Based on Repeated Observations

Elsa has observations for her birth weight (52 kg) and some more repeated measures for her weight. We assume the heritability to be $h^2 = 0.45$. The population mean for the repeated observations of the weight is 170 kg. The repeatability of the weight measurements is $t = 0.65$.

The following tables contains all observed values for the weight.

Measurement	Weight
1	52
2	82
3	112
4	141
5	171
6	201
7	231
8	260
9	290
10	320

The data in the above table can be read from

`## https://charlotte-ngs.github.io/lbgfs2023/data/lbg_ex07_p2_rep_measures.csv`

a) Predict the breeding value for Elsa based on the repeated weight records.
b) What is the reliability for the predicted breeding value from 2a)?
c) Compare the reliability from 2b) with the reliability that would result from a prediction of breeding values based on own performance.

Problem 3: Predict Breeding Values Based on Progeny Records

A few years later Elsa was the dam of 5 offspring. Each of the offspring has a record for weaning weight. Predict the breeding value of Elsa for weaning weight based on the offpsring records listed in the following table.

Offspring	Weaning Weight
1	320
2	319
3	320
4	320
5	321

The data in the above table can be read from

`## https://charlotte-ngs.github.io/lbgfs2023/data/lbg_ex07_p3_prog_rec.csv`

The mean and the heritability can be taken the same as in Problems 1 and 2 resulting in

$h^2 = 0.45$ and $\mu = 250$