Statistics & Data Science	HDDA bonus exercise 1
Leiden University	September 07, 2024

Follow the instructions below carefully:

- Only load the `MASS`-package (and no other packages!). From the `MASS`-package you only need the `ginv`-function (with default settings).
- Load the `assignmentA_grpB.Rdata` file with the assignment and group numbers substituted for `A` and `B`, respectively, into `R`. This file is available via Brightspace.
- Verify that three objects, named `X`, `Y`, and `betas` have been loaded into `R`'s memory. The first two objects contain the data on the response vector (`Y`) and design matrix (`X`). The third one is the true regression parameter $\boldsymbol{\beta}$ vector.
- Consider the linear regression model $\mathbf{Y} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\varepsilon}$ (without intercept) and $\boldsymbol{\varepsilon} \sim \mathcal{N}(\mathbf{0}_n, \sigma^2\mathbf{I}_{nn})$, to explain the variation in the response `Y` by a linear combination of the columns of the design matrix `X`.
- Fit the linear regression model by means of the ridge regression estimation with penalty parameter $\lambda = \mathtt{B}/10$ (with the group number substituted for `B`).
- Extract, in four decimals using the `round`-function from the above evaluated estimator of $\boldsymbol{\beta}$, the `B`-th element (with the group number substituted for `B`). This yields the first part of your answer to the exercise that is to be inserted in the email.
- Evaluate the bias of the ridge regression estimate found above, and decompose this bias into a part due to the penalization and one attributable to the high-dimensionality of the design.
- Extract, in four decimals using the `round`-function from the above evaluated high-dimensional attributable part of the bias, the `B`-th element (with the group number substituted for `B`). This yields the second part of your answer to the exercise that is to be inserted in the email.
- Send your answer (accompanied by `R`-code) in before `23:59` CET, September 23, 2024. Instructions for composing the email can be found in the `pdf`-file with information on the bonus exercises.