

## WEEK 8 HOMEWORK

### INSTRUCTIONS

- Every learner should submit his/her own homework solutions. However, you are allowed to discuss the homework with each other (in fact, I encourage you to form groups and/or use the forums) – but everyone must submit his/her own solution; you may not copy someone else's solution.
- The homework will be peer-graded.
- The homework grading scale reflects the fact that the primary purpose of homework is learning:

Rating	Meaning	Point value (out of 100)
4	All correct (perhaps except a few details) <u>with</u> a deeper solution than expected	100
3	Most or all correct	90
2	Not correct, but a reasonable attempt	75
1	Not correct, insufficient effort	50
0	Not submitted	0

### Question 1

Using the crime data set from Homework 5, build a regression model using:

1. Stepwise regression
2. Lasso
3. Elastic net

For Parts 2 and 3, remember to scale the data first – otherwise, the regression coefficients will be on different scales and the constraint won't have the desired effect.

For Parts 2 and 3, use the `glmnet` function in R.

Notes on R:

- For the elastic net model, what we called  $\lambda$  in the videos, `glmnet` calls "alpha"; you can get a range of results by varying alpha from 1 (lasso) to 0 (ridge regression) [and, of course, other values of alpha in between].
- In a function call like `glmnet(x,y,family="mgaussian",alpha=1)` the predictors `x` need to be in R's matrix format, rather than data frame format. You can convert a data frame to a matrix using `as.matrix` – for example, `x <- as.matrix(data[,1:n-1])`
- Rather than specifying a value of `T`, `glmnet` returns models for a variety of values of `T`.