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**Quiz 1 (Take Home).** Due before Monday’s lecture – please type it up.

1. For the simple linear regression with intercept, please prove that:

Total sum of squares = Regression sum of squares + Error sum of squares; that is,



As we see, the last line has the components:

* first being equal to SSE,
* second being equal to SSR (RegSS)
* and last being equal to zero due to multiplication within the sum between r and x variables

This concludes, SST = SSE + SSR

1. For the simple linear regression with intercept, please derive (a) the least squares estimators, and (b) the method of moment estimators of the model parameters.

Assuming Q, take partial differentials and set to zero to find the LS estimators and

estimator (aka alpha)

estimator (aka beta)

For our method of moments w.r.t Linear Regression, we can refer to OLS. Given OLS and matrix/vector form for the linear model coefficients, we can deduce that:

We can also check that out by refering to the pages of lecture 5 where it was stated so.

Just to recap on the LHS and RHS content mentioned above, here are the open versions, which I copied from the lecture notes. As mentioned, we could see for more details regarding the source point of method of moments from lec5 and a quick search on stackexchange.

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Then, 

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