

Worksheet 14 (Solutions)

1. Consider a simple linear regression where we know that $b_0 = 0$. You can write $b_1 \rightarrow b$ to simplify the notation. Write down the likelihood function for the sample. Do not yet simplify.

Solution: TODO

2. Now, (a) compute the log-likelihood function and simplify. (b) Without doing any calculus (that is, just looking at the function), maximizing the log-likelihood with respect to b is equivalent to minimizing what quantity in terms of y_i , x_i , and b ? Note: Ask me about the correct solution before proceeding.

Solution: TODO

3. Take the derivative of the quantity that you had in part (b) from the previous question with respect to the parameter b . Set this equal to zero to get the MLE.

Solution: TODO

4. What is the distribution of the MLE of b ?

Solution: TODO

5. Go back to the full log-likelihood function. Take the derivative with respect to σ^2 (remember, this is a single parameter, not the square of a parameter). Set this to zero and solve to get the MLE of σ^2 .

Solution: TODO