*Note: accuracy of these solutions cannot be guaranteed; feel free to comment or correct any errors you may see. The change in syllabus means that covering Q2 is not likely to be useful. It is recommended to use the desktop version of Word due to the equations (File -> Info from the web version) and is required if you want to edit equations.*

# Answer 1

(

## Part (a)

This is an application of Bayes’ theorem. Notice that

## Part (b)

The solution at this EdSTEM post (<https://edstem.org/us/courses/14710/discussion/945645>) is reproduced here. In short,

1. Use the variance sum formulas, noting that the covariance between and is 0 which means that that term does not need to be written.
2. Write the variables and as a vector. Then, what is needed is to find the covariance matrix and mean, which needs to be computed individually. Finally, plug it in the formula for the multivariate Gaussian.
3. Simply use the formula for the conditional density of a Gaussian (this is in the formula sheet) and substitute the variables. You could also simply use the conditional probability rule in theory, but I suspect that won’t be enough from an exam point of view as the answer will be in a fraction of multivariate Gaussians.

Text

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Text

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## Part (c)(i)

### Part 1(A) and 1(B)

and .

The below is reproduced from Mads Jenkins’ post on EdSTEM.

Text, letter

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### Part 1(C)

(credit Anonymous Lapwing in Edstem)

A piece of paper with writing on it

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### Part (B)

*Note: the answers may change slightly depending on whether the typo in the question (see* <https://edstem.org/us/courses/14710/discussion/948567>) *is taken literally. For instance, if we take the typo literally, then must be multiplied by .*

*It is possible to solve and using vector notation, however, note that use of the Kronecker product (which is not the same as the Kronecker delta) is needed, otherwise you’ll get the dimensions wrong (see comment on the right).* [*http://www.matrixcalculus.org/*](http://www.matrixcalculus.org/) *may help if you take that route.*

T

DL/dCij = -2 \* ei \* zj??? <----- IS this right for final answer – (for dl/dx^ \* dx^/dc)?? Anyone get this wag1

Where ei= xi- x^I

(ignoring summation to N btw)^

So crowded...