* Ex.3.8: conditional mean and variance of the sum of two RV’s

Let measurement , , are independent. Find the the minimum variance estimate

* a priori information,
* a noise,
* In order to find , so need to find

Since , need

Here, (x,y) plane, the integral

is considered as a function of , and the has the value on the dark blue lines,.

X

Y

1. Find

Now the dark lines outsides of the , the integral should be zero.

1. 🡪

* Plot and find

1. Find

The conditional pdf , so we need and

Since is derived in the previous, we may calculate .

Now .

And

And

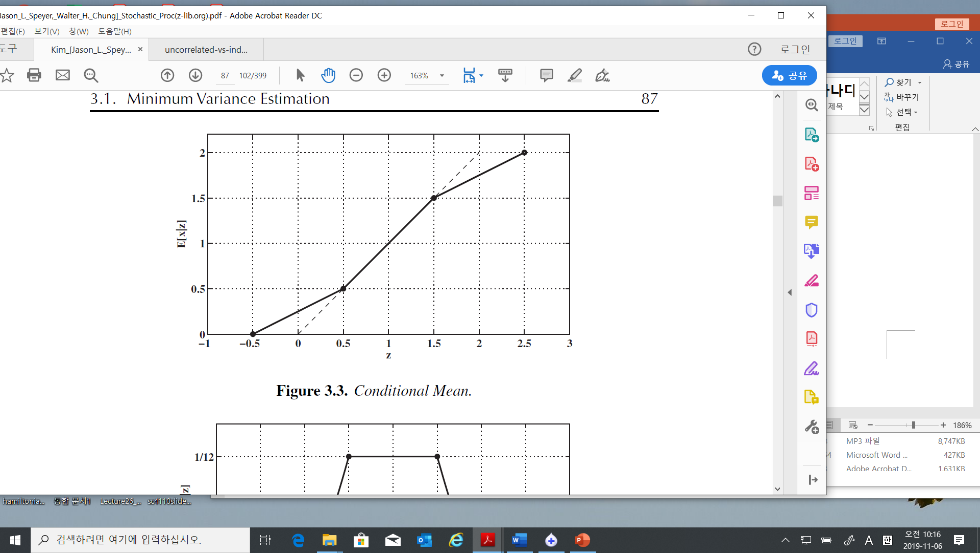
And

* Plot

1. Comparison between and ,
2. For un-conditional expectation and variance
3. For conditional expectation and variance

* For ,
* For ,
* For ,

1. Analysis

 So The conditional variance has the maximum 1/12 smaller than that of the unconditional 1/3

1. Comments

Here the problem is to find **the best estimator** by measuring the .

From the Figure(3.3), One of the estimators the unconditional expectation is depicted as a broken line and the solid line is the best estimator , the conditional expectation.

1. What the estimators

* The unconditional expectation
* The conditional expectation

Form the graph, given the measurement

1. If the noise is more random, i.e., the variance is larger and larger, then the solid line has no slope, i.e., the parallel to the x- axis at
2. If the variance is more smaller, then