

Digital Signal Processing - Assignment 5

June 12, 2015

Stephanie Lund (2555914)
Aljoscha Dietrich (2557976)

Exercise 1

1.1

See included file 'hw5.m'.

1.2

TODO: finish code and generate graph

Exercise 2

If z_1 and z_2 are independent, the covariance matrix is:

$$\begin{bmatrix} E[(z_1 - \mu_1)^2] & E[(z_1 - \mu_1)(z_2 - \mu_2)]^2 \\ E[(z_1 - \mu_1)(z_2 - \mu_2)]^2 & E[(z_2 - \mu_2)^2] \end{bmatrix}$$

To show that the matrix is diagonal, we need to show that $E[(z_1 - \mu_1)(z_2 - \mu_2)]^2 = 0$.

$$\begin{aligned} E[(z_1 - \mu_1)(z_2 - \mu_2)] &= E[z_1 z_2 - z_1 \mu_2 - z_2 \mu_1 + \mu_1 \mu_2] \\ &= E[z_1 z_2] - E[z_1]E[z_2] - E[z_1]E[z_2] + E[z_1]E[z_2] \\ &= E[z_1 z_2] - E[z_1]E[z_2] \\ &= 0 \end{aligned}$$

The last step is true since z_1 and z_2 are independent.

Bonus

TODO