Natural Image Statistics
Homework for chapter 4
Model solutions (Jussi Martin)

1. (Math exercise 1 from chapter 4).

Solution:
If we right the conditional probabilty as

$$p(z_2|z_1 = a) = \frac{p_{\mathbf{z}}(a, z_2)}{\int p_{\mathbf{z}}(a, z_2)dz_2}$$

we see that integration over z_1 gives us

$$\int p(z_2|z_1 = a)dz_2 = \int \frac{p_{\mathbf{z}}(a, z_2)}{\int p_{\mathbf{z}}(a, z_2)dz_2}dz_2 = \frac{\int p_{\mathbf{z}}(a, z_2)dz_2}{\int p_{\mathbf{z}}(a, z_2)dz_2} = 1$$

since the denominator is just a constant.

2. (Math exercise 2 from chapter 4).

Solution:

3. (Math exercise 6 from chapter 4).

Solution: