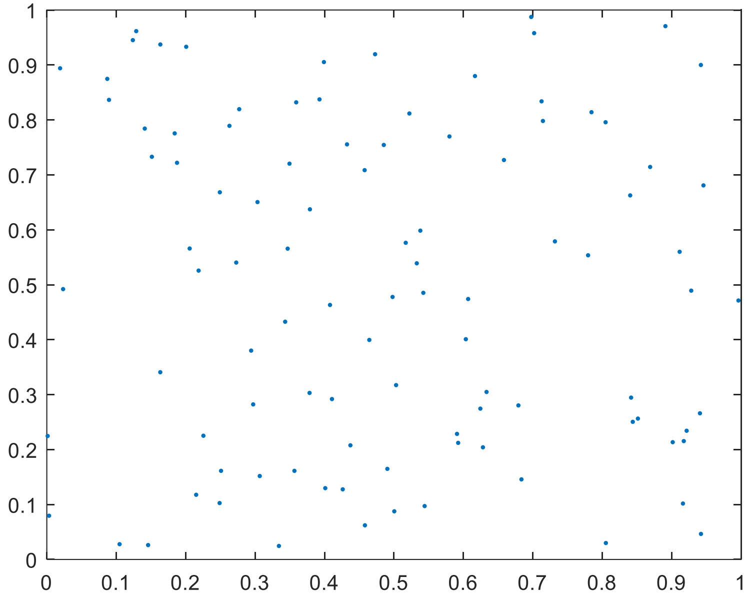
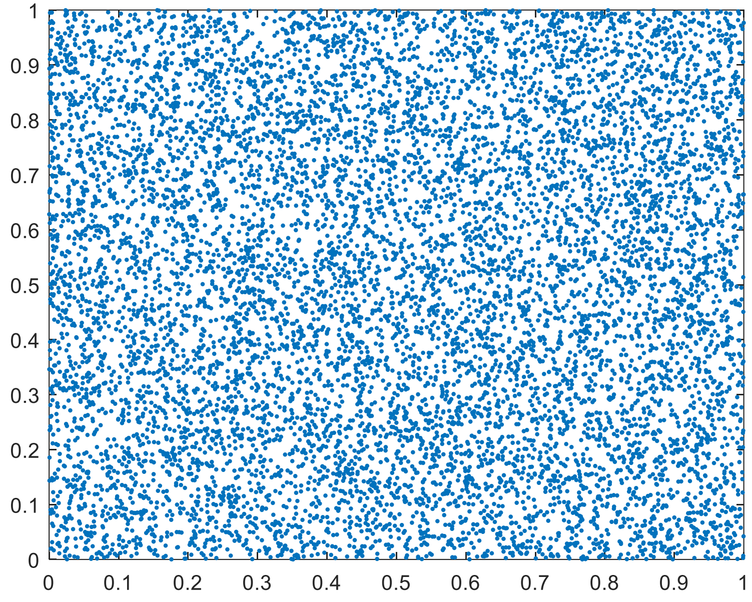
Estimating PDF and CDF by Generating Random Samples





Scatter diagrams for two different number of generated samples from a Uniform joint distribution: 100 (left) and 10000 (right)

Textbooks: Fikri Öztürk, Levent Özbek, “Matematiksel Modelleme ve Simülasyon”, 2004.
Averill M. Law, “Simulation Modeling and Analysis”, McGraw-Hill, 2015.

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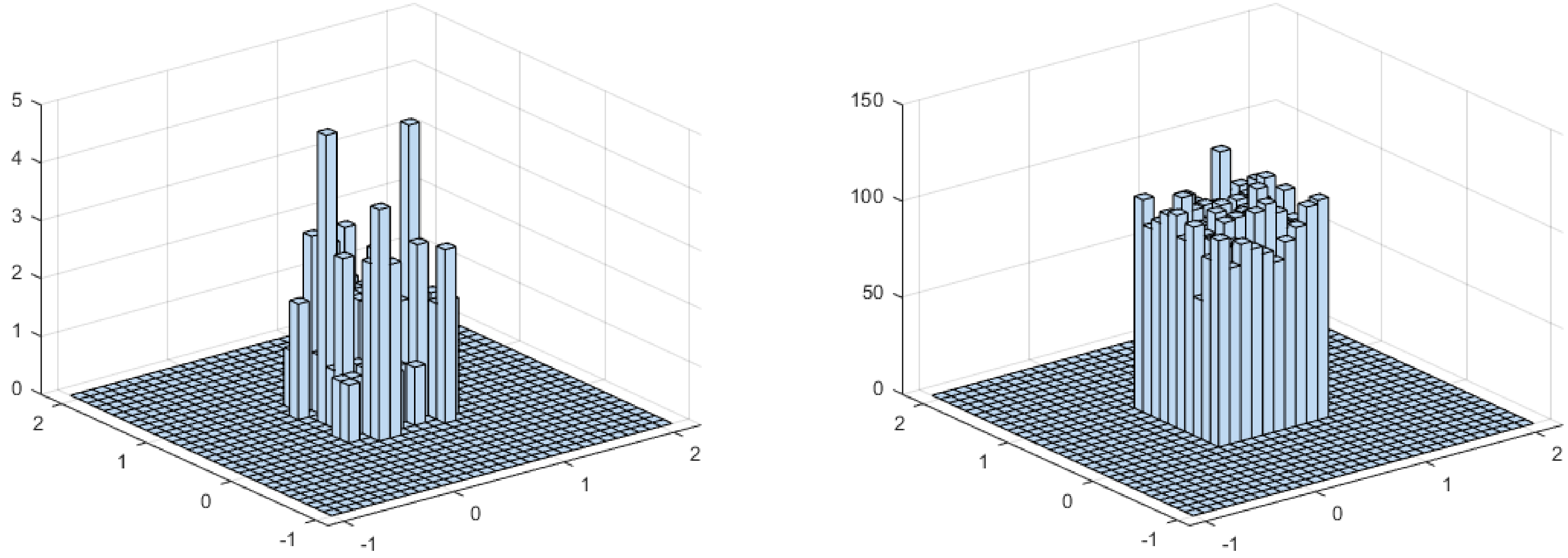

Histograms for two different number of generated samples: 100 (left) and 10000 (right)

Textbooks: Fikri Öztürk, Levent Özbek, "Matematiksel Modelleme ve Simülasyon", 2004.
Averill M. Law, "Simulation Modeling and Analysis", McGraw-Hill, 2015.

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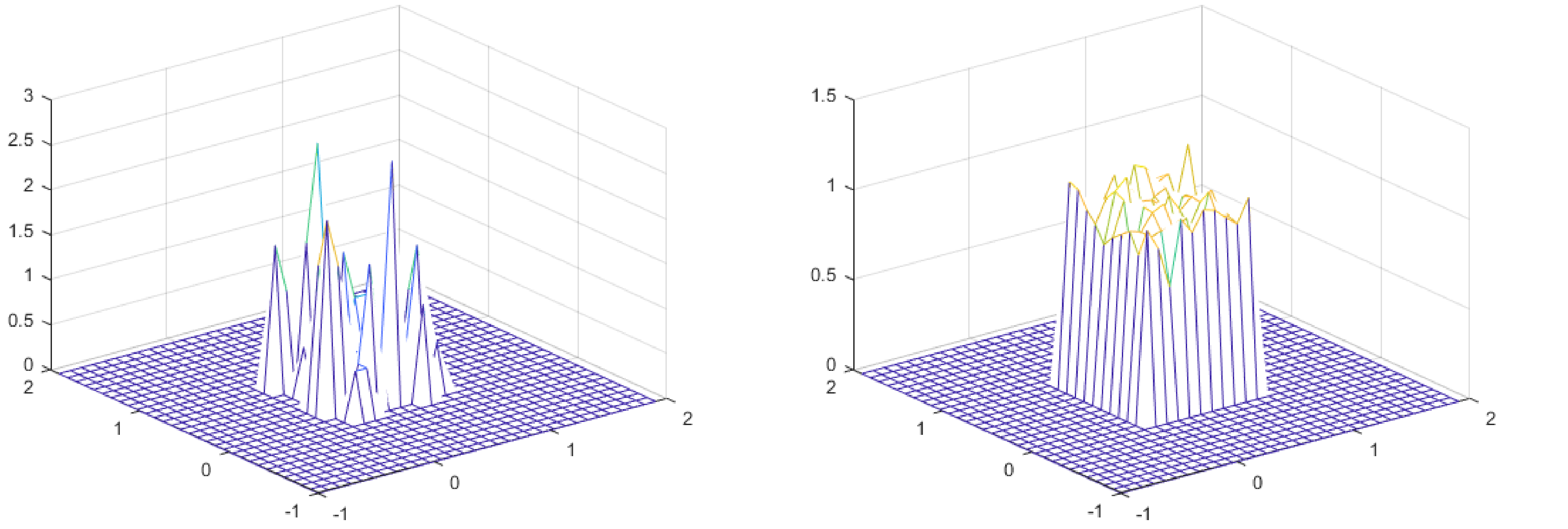
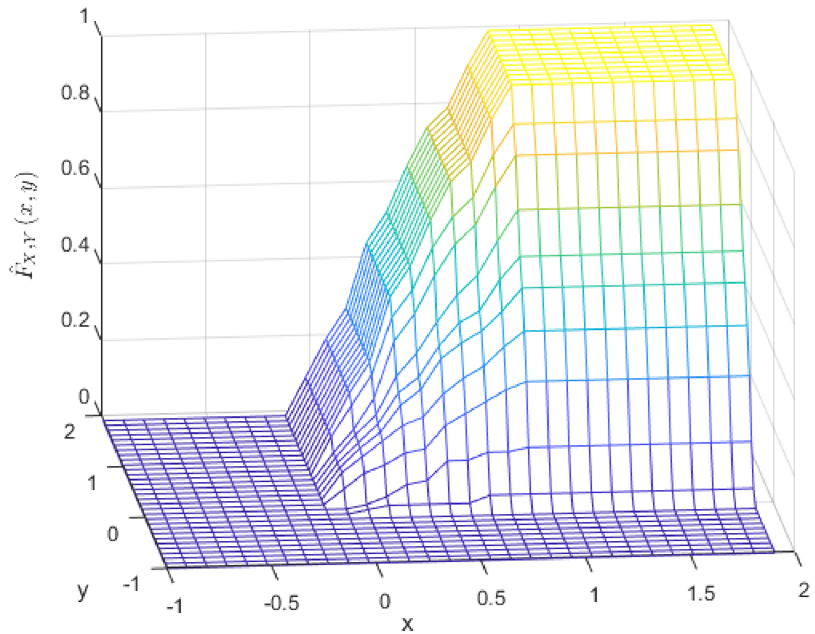


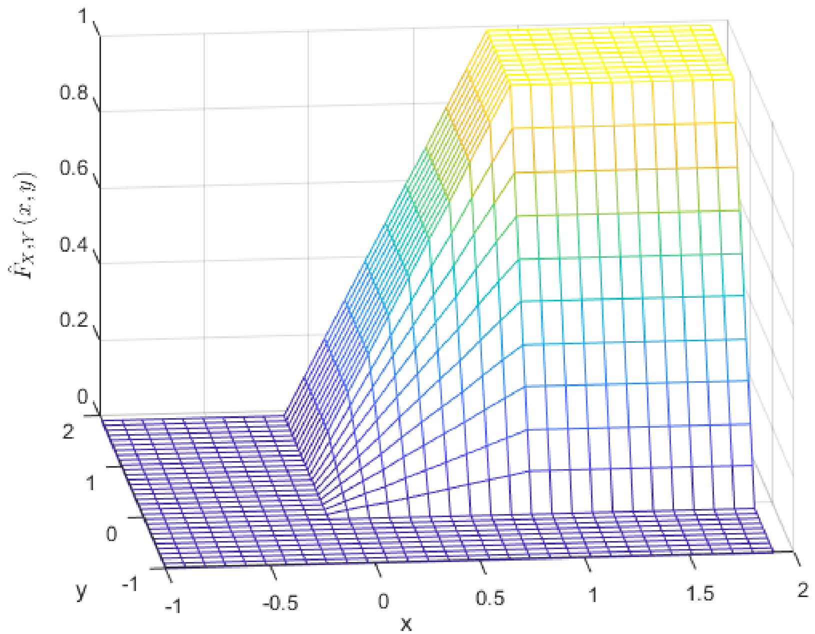
PDF estimations for two different number of generated samples: 100 (left) and 10000 (right)

Note that a better approximation of the target PDF is obtained as the number of samples increases.

Textbooks: Fikri Öztürk, Levent Özbek, "Matematiksel Modelleme ve Simülasyon", 2004.
Averill M. Law, "Simulation Modeling and Analysis", McGraw-Hill, 2015.

Estimating PDF and CDF by Generating Random Samples





CDF estimations for two different number of generated samples: 100 (left) and 10000 (right)

Note that a better approximation of the target CDF is obtained as the number of samples increases.

Textbooks: Fikri Öztürk, Levent Özbek, “Matematiksel Modelleme ve Simülasyon”, 2004.
Averill M. Law, “Simulation Modeling and Analysis”, McGraw-Hill, 2015.

The joint PDF of two independent Normal RVs

Let X and Y **independent Gaussian** random variables.

Means : μ_x μ_y

Variances: $\sigma_x^2,\ \sigma_y^2$

The joint PDF:

$$f_{X,Y}(x,y) = f_X(x)\, f_Y(y) = \frac{1}{2\pi\sigma_x\sigma_y}\exp\left(-\frac{(x-\mu_x)^2}{2\sigma_x{}^2} - \frac{(y-\mu_y)^2}{2\sigma_y{}^2}\right)$$

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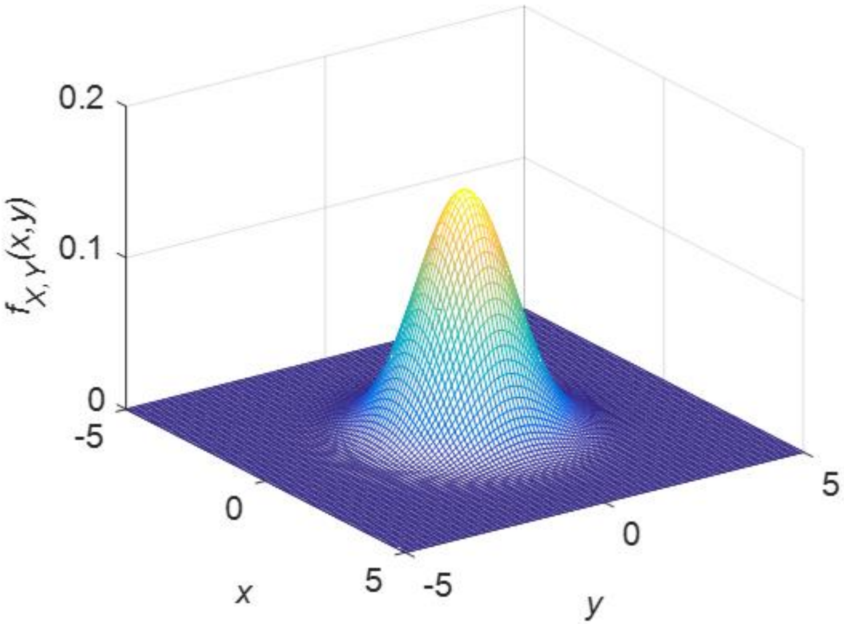
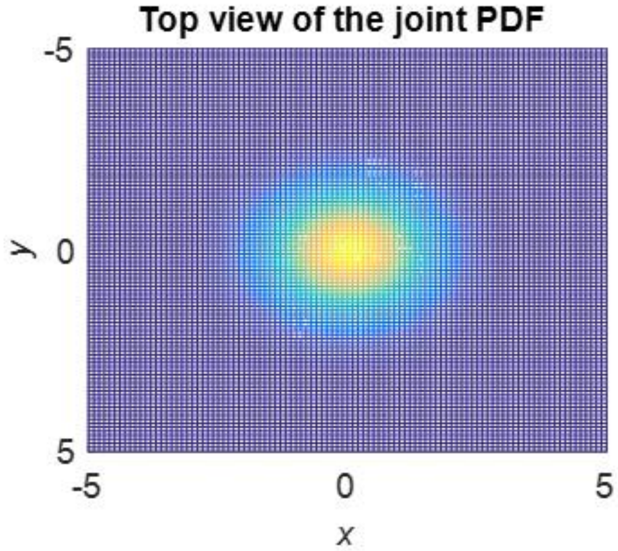
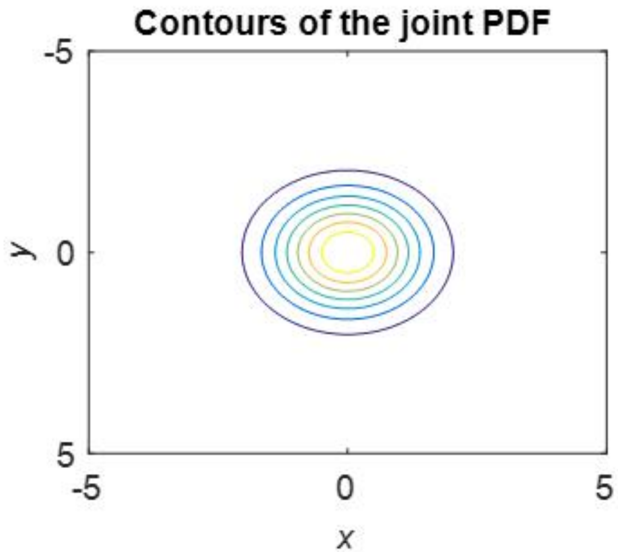
The joint PDF of two independent Normal RVs



in three-dimensional space
$(\sigma_X = 1, \sigma_Y = 1)$





Textbooks: Fikri Öztürk, Levent Özbek, “Matematiksel Modelleme ve Simülasyon”, 2004.
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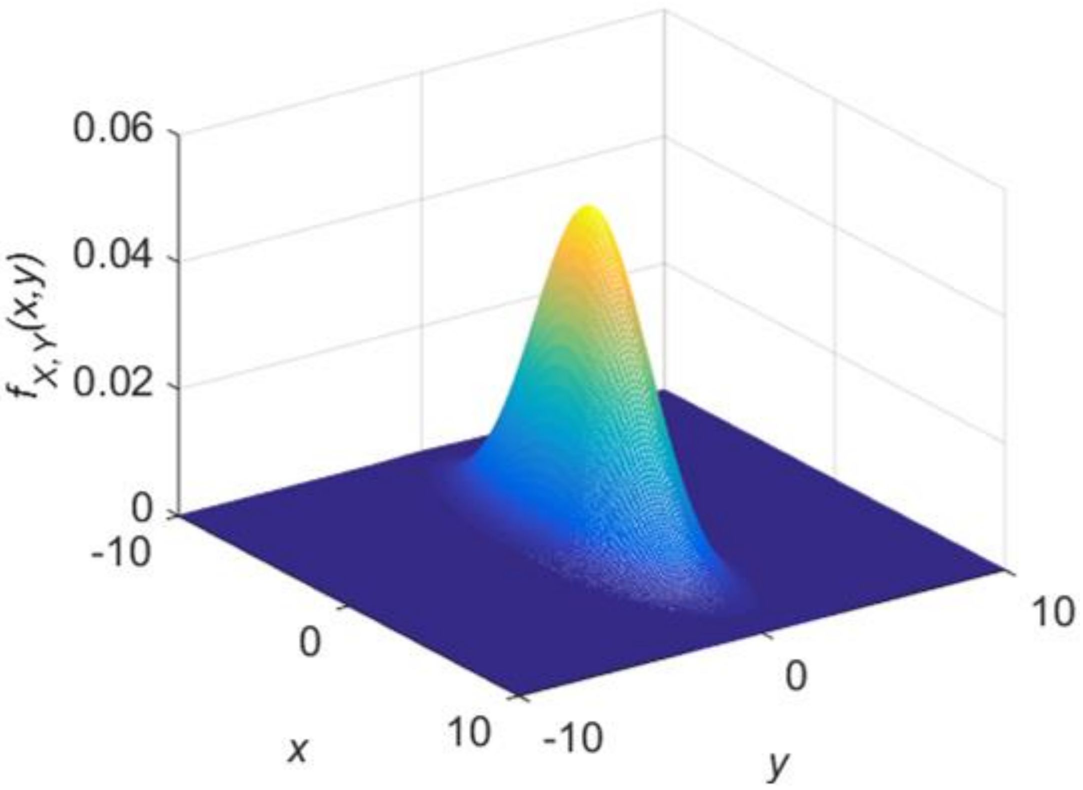
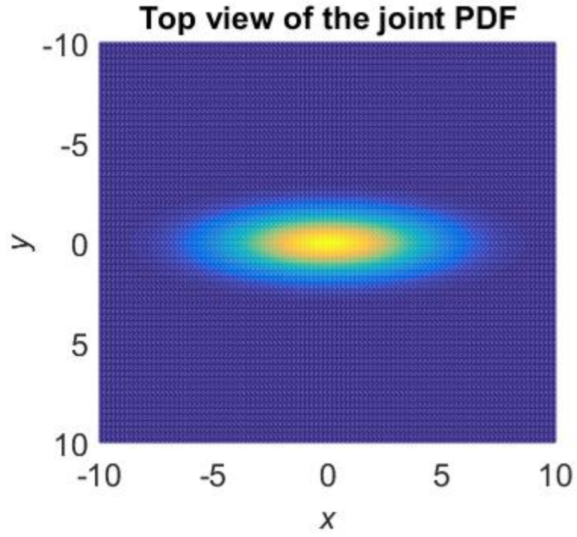
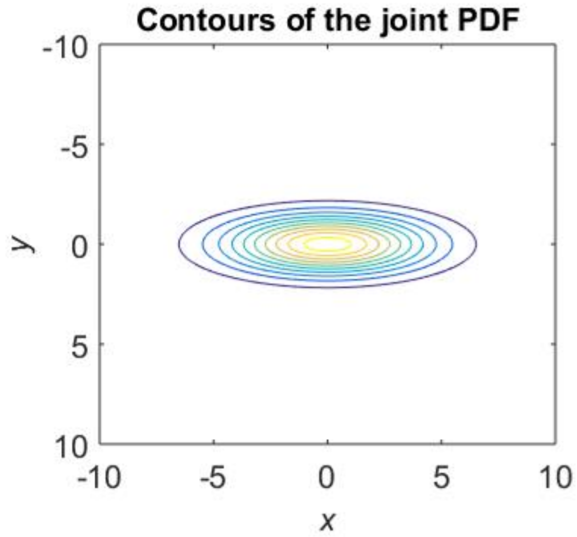
The joint PDF of two independent Normal RVs





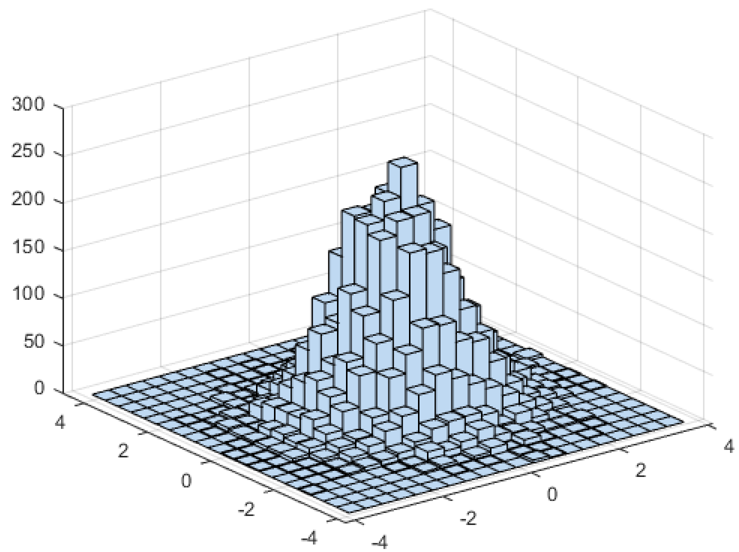


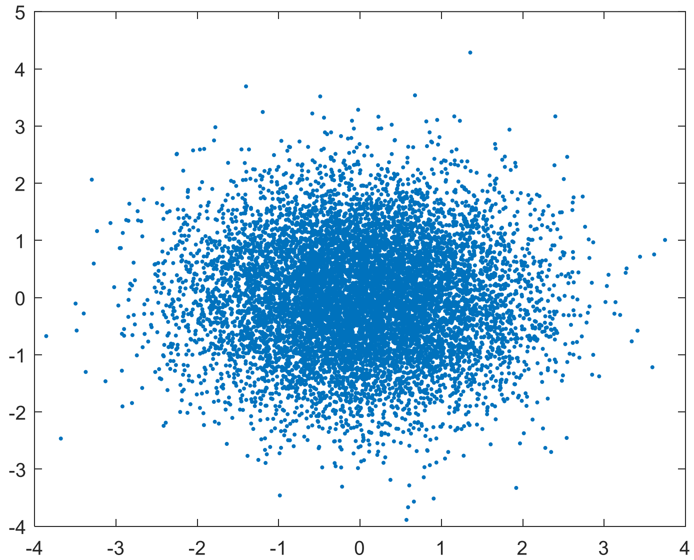
in three-dimensional space ($\sigma_X = 3$, $\sigma_Y = 1$)

Textbooks: Fikri Öztürk, Levent Özbek, "Matematiksel Modelleme ve Simülasyon", 2004.
Averill M. Law, "Simulation Modeling and Analysis", McGraw-Hill, 2015.

The joint PDF of two independent Normal RVs

Generating random samples





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