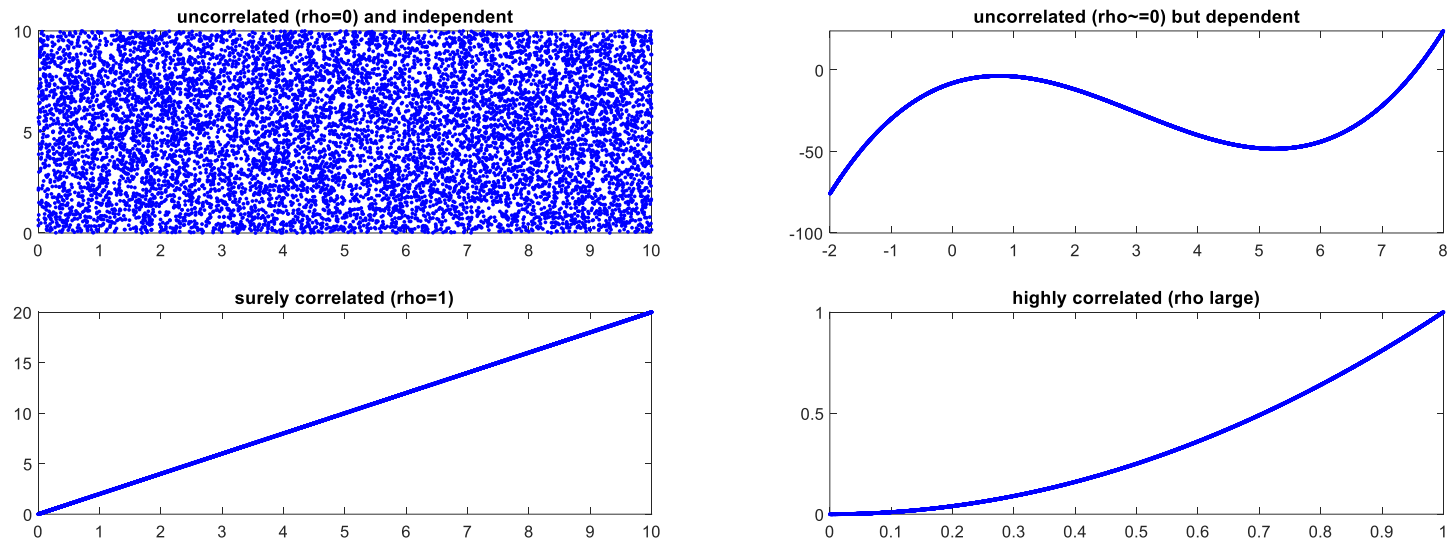# Scatter Diagram for two Uniform RVs
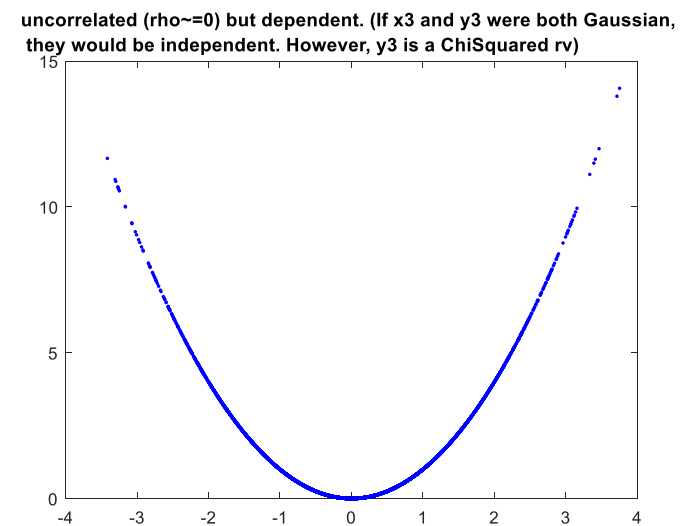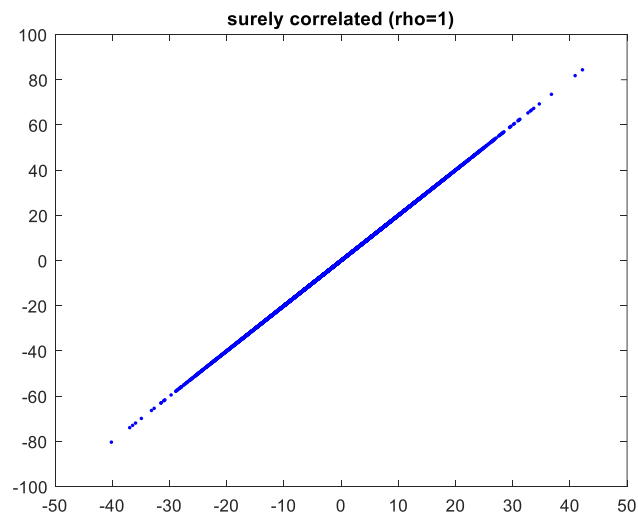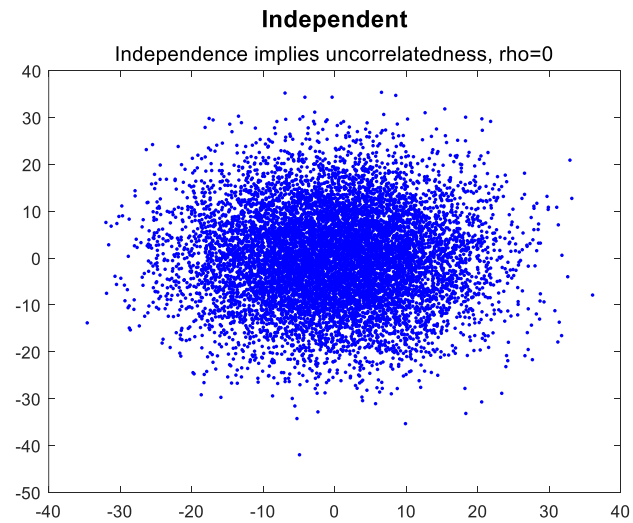

Figure: Scatter diagram for two Uniform RVs

$$\rho_{XY} = \frac{\mathrm{cov}(X,Y)}{\sigma_X \sigma_Y}$$

Scatter Diagram for two Gaussian RVs

Independent
Independence implies uncorrelatedness, rho=0

surely correlated (rho=1)

uncorrelated (rho~=0) but dependent. (If x3 and y3 were both Gaussian, they would be independent. However, y3 is a ChiSquared rv)

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

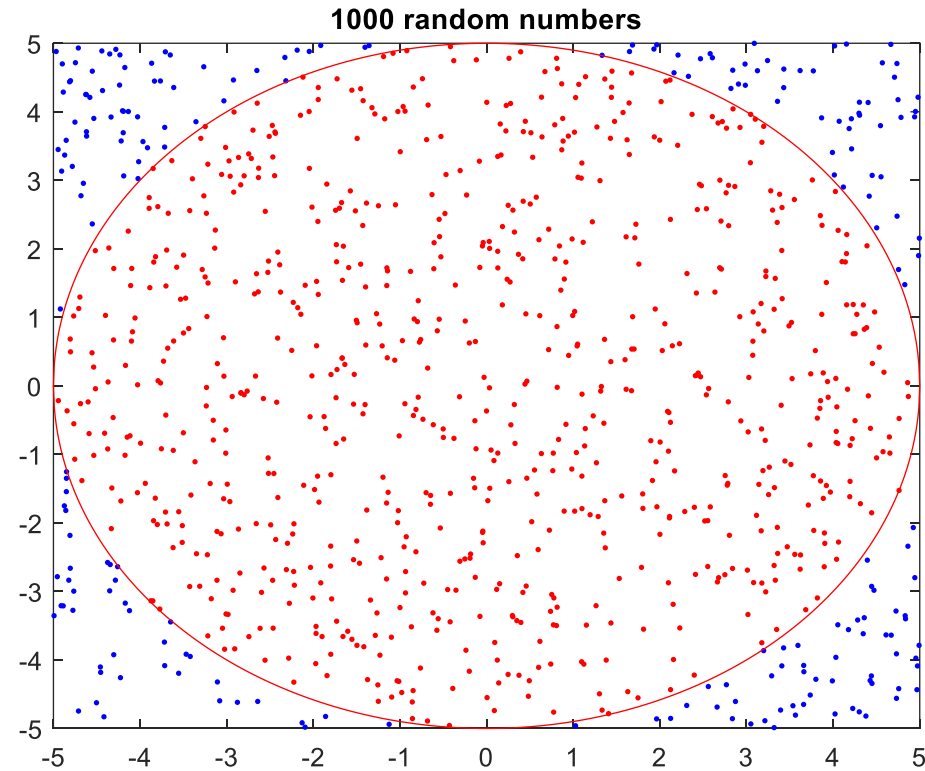# Monte Carlo Integral

Let us consider the problem of calculating the **area of a <u>disk</u>** through Monte Carlo integration.
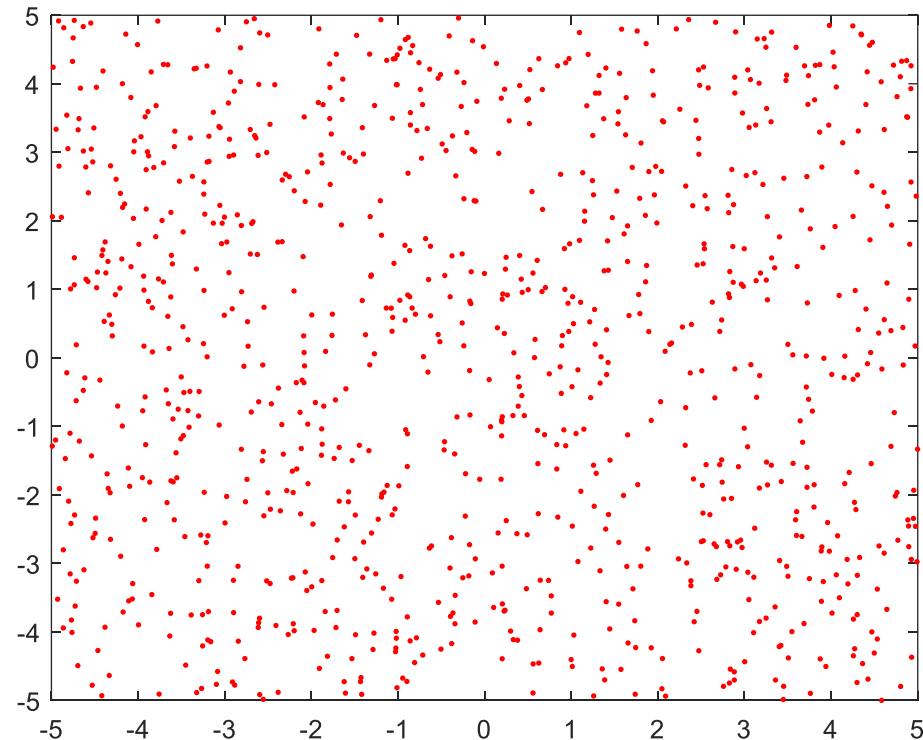
Generating samples from a **<u>joint Uniform</u>** distribution
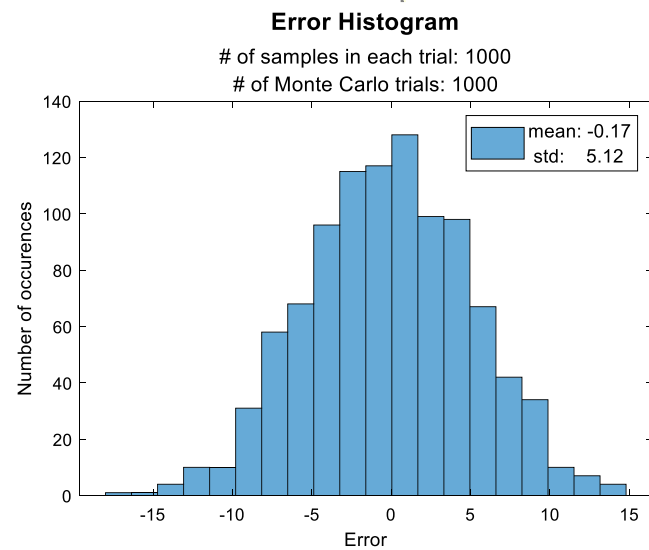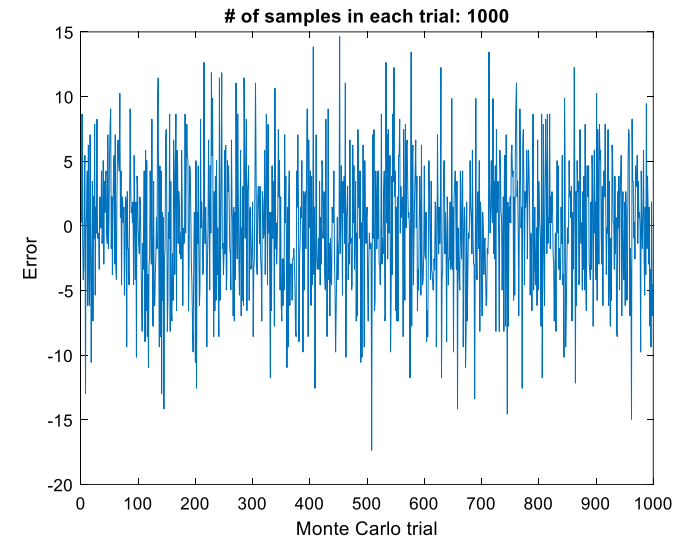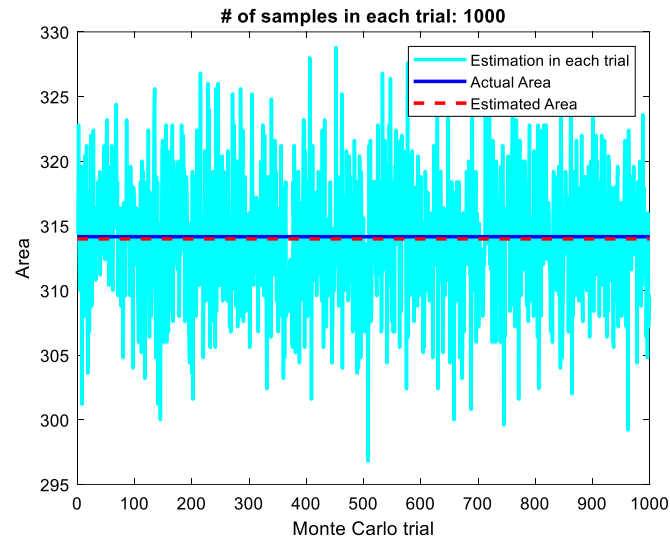
Monte Carlo Integral
Area of a Disk

1000 random numbers

Count the number of samples inside the circle encloses the disk.

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

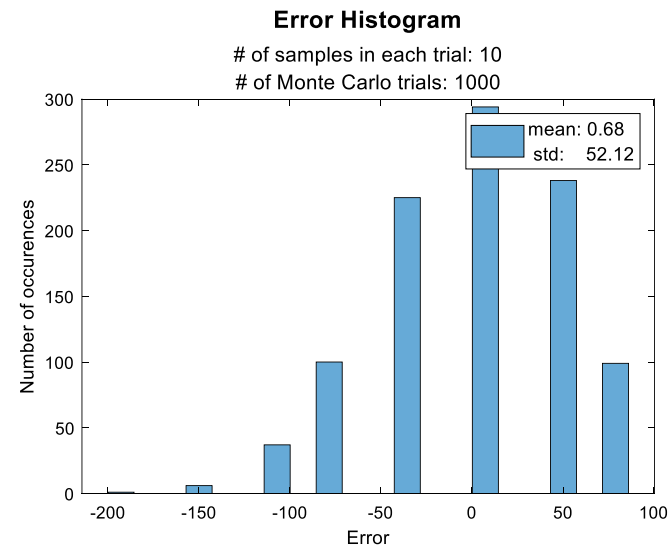# Monte Carlo Integral
Area of a Disk

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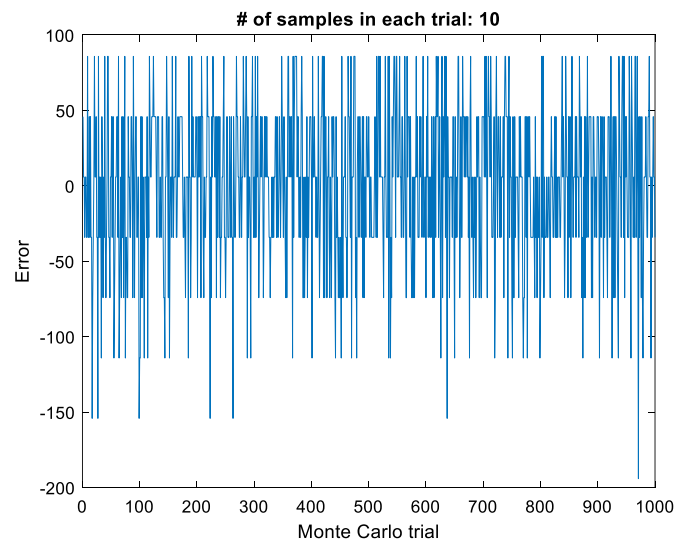Averill M. Law, "Simulation Modeling and Analysis", McGraw-Hill, 2015.

Monte Carlo Integral
Area of a Disk

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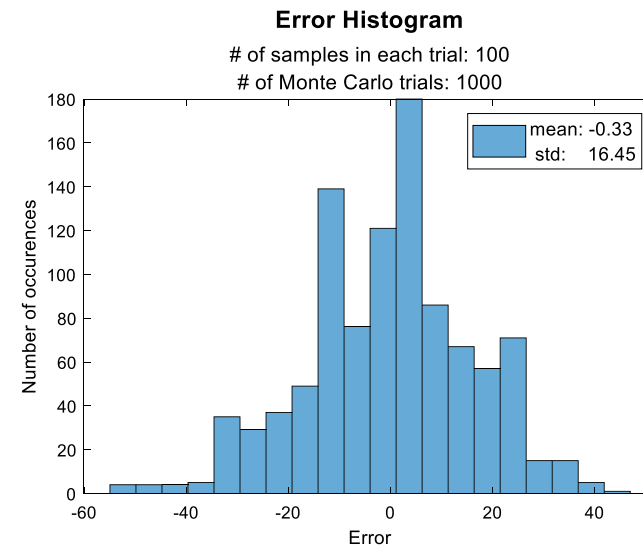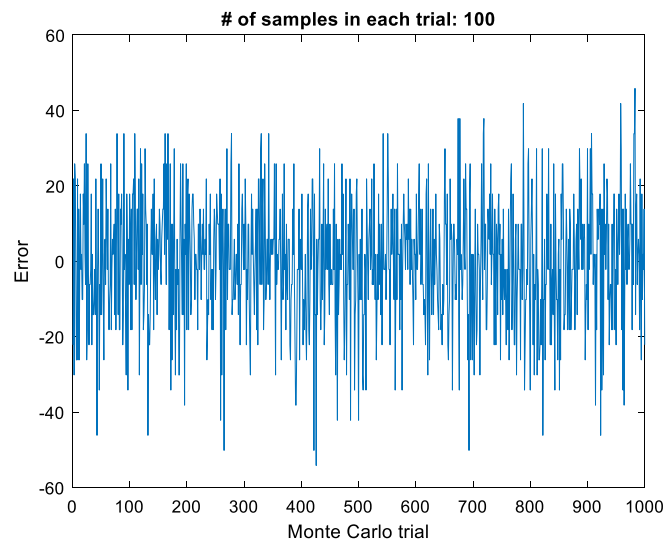   Averill M. Law, "Simulation Modeling and Analysis", McGraw-Hill, 2015.

Monte Carlo Integral
Area of a Disk

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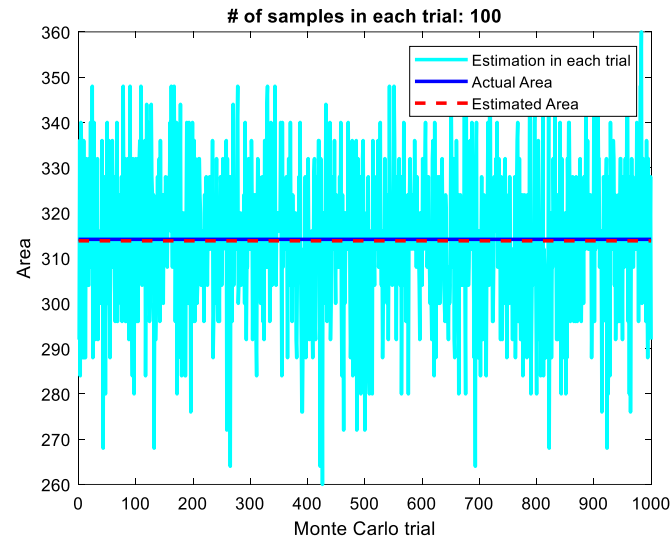Averill M. Law, "Simulation Modeling and Analysis", McGraw-Hill, 2015.
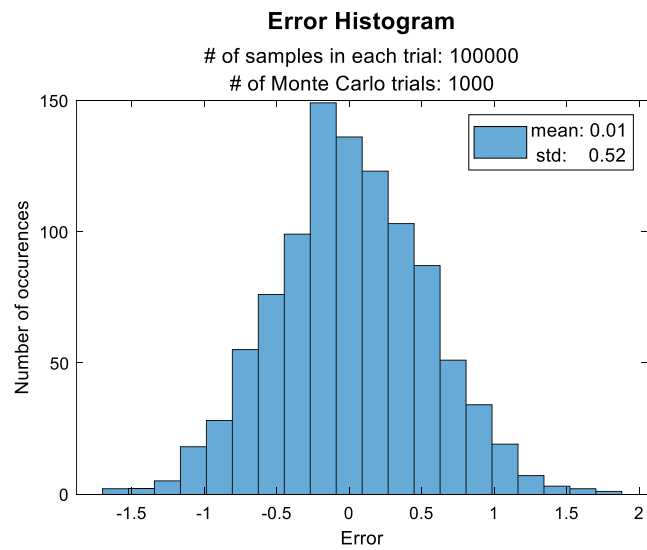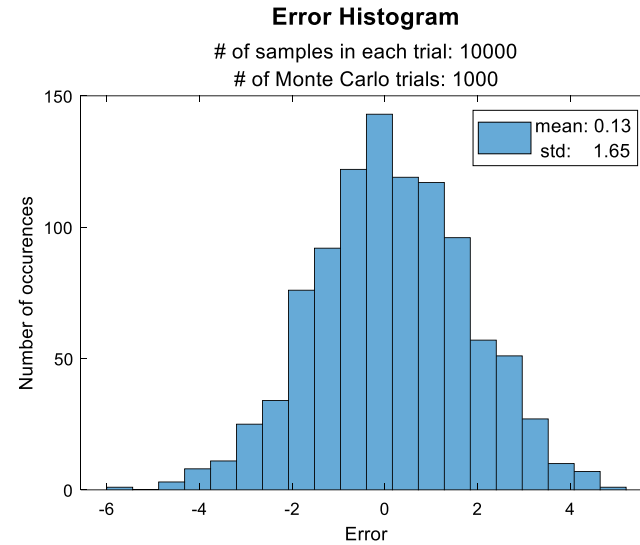
Monte Carlo Integral
Area of a Disk

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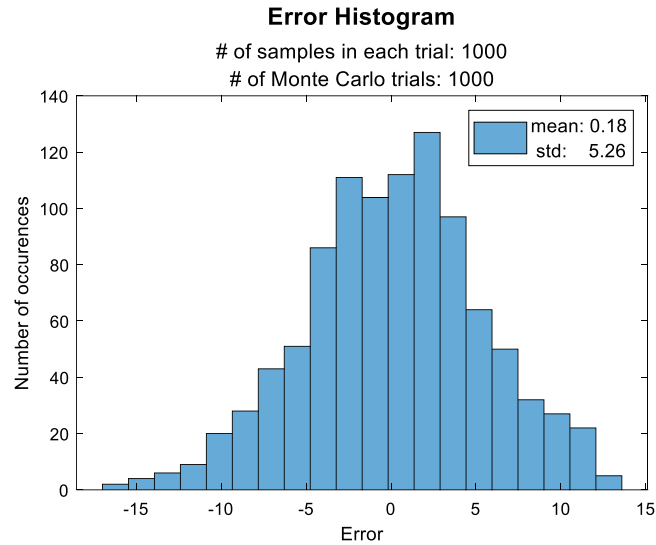Averill M. Law, "Simulation Modeling and Analysis", McGraw-Hill, 2015.

Monte Carlo Integral
Area of a Disk

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Averill M. Law, "Simulation Modeling and Analysis", McGraw-Hill, 2015.