m = 5;

sigma = 2;

n = 10000;

data = m + sigma * randn(n, 1);

figure;

histogram(data, 'Normalization', 'pdf');

hold on;

x = linspace(min(data), max(data), 1000);

pdf_theory = (1 / (sqrt(2*pi) * sigma)) * exp(-((x - m).^2) / (2 * sigma^2));

plot(x, pdf_theory, 'r', 'LineWidth', 2);

hold off;

xlabel('x');

ylabel('Probability Density');

title('Histogram and Theoretical Gaussian PDF');

legend('Simulated Data', 'Theoretical PDF');