using Plots

maxiter = 10000 # More iterations for more data

window\_size = 50 # Window size for the rolling average

function f(x, r=4)

r \* x \* (1 - x)

end

x0 = 0.8

stored\_x = zeros(maxiter)

stored\_x[1] = x0

for n = 2:maxiter

stored\_x[n] = f(stored\_x[n-1])

end

# Calculate the rolling averages

rolling\_averages = zeros(maxiter)

rolling\_averages[1] = stored\_x[1]

for i = 2:(maxiter)

rolling\_averages[i] = (49\*rolling\_averages[i-1] + stored\_x[i])/50

end

for i = 1:maxiter

rolling\_averages[i] = floor(100 \* rolling\_averages[i])

end

# Plotting the distribution of rolling averages

histogram(rolling\_averages, bins=30, label="Rolling Averages", xlabel="Average Value", ylabel="Frequency", title="Distribution of Rolling Averages")

using Plots

# Assuming mean\_val and std\_dev are already calculated

mean\_val = mean(rolling\_averages)

std\_dev = std(rolling\_averages)

# Manually calculate the PDF values

function normal\_pdf(x, μ, σ)

return (1.0 / (σ \* sqrt(2 \* π))) \* exp(-0.5 \* ((x - μ) / σ)^2)

end

# Generate the x values (ensure this covers the range of your data)

x\_vals = collect(minimum(rolling\_averages):0.1:maximum(rolling\_averages))

# Calculate the PDF for each x value

normal\_dist = [normal\_pdf(x, mean\_val, std\_dev) for x in x\_vals]

# Plotting the histogram

histogram(rolling\_averages, bins=30, label="Rolling Averages", normed=true, xlabel="Average Value", ylabel="Frequency", title="Distribution of Rolling Averages")

# Overlay the manually calculated normal distribution

plot!(x\_vals, normal\_dist, label="Normal Distribution", linewidth=2, color=:red)