```python
import numpy as np
import matplotlib.pyplot as plt
from scipy.stats import beta

# Parameters
p_star = 0.01  # True probability of success
alpha = 7      # Parameter of prior distribution
beta_param = 2  # Parameter of prior distribution
NN = [99, 80, 70, 50, 25, 15, 10, 8, 5, 3]  # Sample sizes we will try

# Plot distributions of the MAP and the MLE
for N in NN:
    # MAP distribution
    p_values = np.linspace(0, 1, 1000)  # all possible values of p (continuous)
    alpha_prime = N * p_star + alpha  # Parameter of expected posterior distribution
    beta_prime = N * (1 - p_star) + beta_param  # Parameter of expected posterior distribution
    posterior = beta.pdf(p_values, alpha_prime, beta_prime)  # Calculate posterior
distribution

    # MLE distribution
    p_values_mle = np.linspace(0, 1, N + 1)  # all possible values of p (discrete)
    likelihood = beta.pdf(p_values_mle, 1 + N * p_star, 1 + N * (1 - p_star))  # Calculate
likelihood using beta distribution

    # Normalize likelihood to match the scale of the posterior
    likelihood = likelihood / np.max(likelihood) * np.max(posterior)

    # Plot
    plt.figure()
    plt.plot(p_values, posterior, 'k', linewidth=4, label='posterior $P(p | \mathbf{X})$')
    plt.plot(p_values_mle, likelihood, 'b-o', linewidth=2, label='likelihood $P(\mathbf{X} |
p)$')
    plt.xlabel('$p$', fontsize=20)
    plt.ylabel('', fontsize=20)
    plt.xticks([0, p_star, 1], ['0', '$p^*$', '1'], fontsize=20)
    plt.yticks([])
    plt.title('$N = {}$'.format(N), fontsize=25)
    plt.legend(fontsize=20, loc='upper left')
    plt.tight_layout()

    # Save figure
    plt.savefig(f'images_01/MAPvsMLE_{N}.jpg')

# plt.show()
```