STAT 201B HW7

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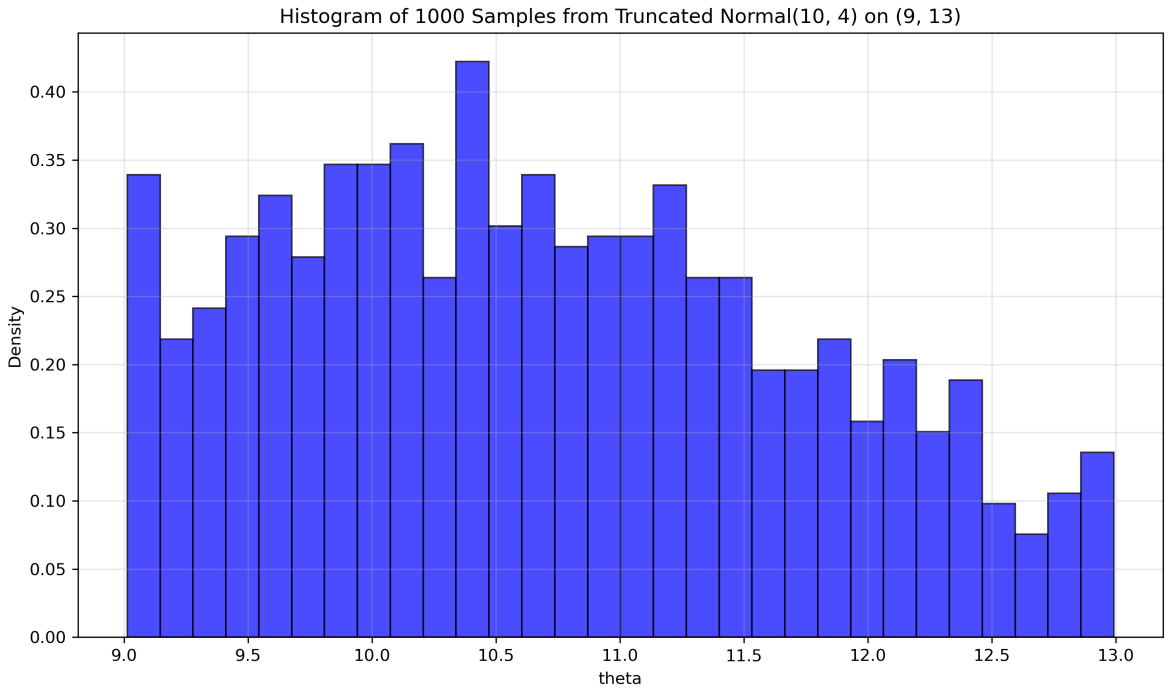
Problem 4c

```python
import numpy as np
import matplotlib.pyplot as plt

# Set random seed for reproducibility
np.random.seed(42)

# Parameters
mu = 10
sigma_squared = 4
sigma = np.sqrt(sigma_squared)
alpha = 9
beta = 13
B = 1000

# Rejection sampling algorithm
samples = []

while len(samples) < B:
    # Generate proposal from Normal(mu, sigma^2)
    theta_star = np.random.normal(mu, sigma)

    # Accept if alpha < theta_star < beta
    if alpha < theta_star < beta:
        samples.append(theta_star)

samples = np.array(samples)

# Create histogram
plt.figure(figsize=(10, 6))
plt.hist(samples, bins=30, density=True, alpha=0.7, color='blue', edgecolor='black')
plt.xlabel('theta')
plt.ylabel('Density')
plt.title(f'Histogram of {B} Samples from Truncated Normal({mu}, {sigma_squared}) on ({alpha}, {beta}
plt.grid(True, alpha=0.3)
plt.tight_layout()
plt.show()
```


Histogram of 1000 Samples from Truncated Normal(10, 4) on (9, 13)
Density
theta
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
9.0
9.5
10.0
10.5
11.0
11.5
12.0
12.5
13.0