

MAT 2377, FALL 2009
Minitab project
Due in class on November 23, 2009

Include your outputs, explain carefully your conclusions.

1. (a) Generate 30 sample of size 50 from a uniform distribution on $[0, 1]$. Use the rmean command in minitab to calculate the average of each row. Check the histogram and nscore plot of these averages. State your conclusion carefully. Justify your conclusion by available theoretical results. Repeat the same with exponential distribution.

(b) Generate a sample of size 30 from a normal distribution with $\mu = 10$ and $\sigma^2 = 16$. Use your sample to give a point estimate for μ and σ^2 . How close your estimates are ? Now draw 30 sample of size 50 from the same distribution. Find 95% confidence intervals for the population mean. What percentage of these confidence intervals cover the actual value of the population mean ($\mu = 10$).

2. Resistors connected in a parallel circuit satisfy the following equation

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}.$$

Let $R_1 \sim N(20, 1)$ and $R_2 \sim N(30, 2)$. Use a simulation procedure to find the distribution for R (in a parallel circuit). Draw a histogram and estimate

$$P(15 < R < 20).$$

3. (a) Draw a sample of size $n = 40$ from the following discrete distribution

$$f(x) = 0.2, x = 0, f(x) = 0.6, x = 1, f(x) = 0.2, x = 2, f(x) = 0 \text{ otherwise.}$$

Estimate μ and σ^2 and compare your results with μ and σ^2 .

(b) Repeat part (a) 60 times and draw a histogram and normal probability plots for the mean of these 60 samples. Explain your conclusions.

4. Generate $n = 100$ sample from a normal distribution with mean $\mu = 10$ and $\sigma^2 = 25$. Draw a histogram for the distribution of $(X_i - \mu)^2 / \sigma^2, i = 1, 2, \dots, 100$. Explain your result. Estimate

$$P((X - \mu)^2 / \sigma^2 < 2)$$

and compare it with its actual value.

5. Do the following problems from the textbook: 7.14, 7.21, 7.26.