Stat 252 Winter 2007
Assignment #4

This assignment is due at the beginning of class on Friday, February 16, 2007. You must submit all problems that are marked with an asterix (*).

1. Rework the first midterm paying careful attention to your mistakes.

2. Do the following exercises from Wackerly, et al.

- #8.30, page 379
- #8.36, #8.37, #8.38, page 384
- #8.25, page 378
- #8.50, page 393

3. * Do the following exercises from Wackerly, et al.

- #8.10, page 369
- #8.15, page 370
- #8.32, page 380 (This is somewhat challenging.)
- #8.43, page 391 (Use the t-value from `http://statpages.org/pdfs.html`.)

4. * Suppose that $Y_1, \ldots, Y_n$ are independent Uniform$(0, \theta)$ random variables. Let $\hat{\theta} = \max\{Y_1, \ldots, Y_n\}$. Use the pivotal method to construct a symmetric 90% confidence interval for θ based on $\hat{\theta}$.

5. * Consider a random variable Y with density function

$$f_Y(y) = 2\theta^{-2}y, \quad 0 \leq y \leq \theta$$

for some parameter $\theta > 0$. Use the pivotal method to verify that if $0 < \alpha < 1$, then

$$\left[\frac{Y}{\sqrt{1-\alpha/2}}, \frac{Y}{\sqrt{\alpha/2}} \right]$$

is a confidence interval for θ with coverage probability $1 - \alpha$.

6. * Consider a random variable Y with density function

$$f_Y(y) = \theta^2 e^{-\theta^2 y},$$

where $y > 0$ and $\theta > 0$. Assume that $0 < \alpha_1 < \frac{1}{2}$ and $0 < \alpha_2 < \frac{1}{2}$. Using the pivotal quantity $U = \theta^2 Y$, verify that

$$\left[\sqrt{\frac{-\log(1-\alpha_1)}{Y}}, \sqrt{\frac{-\log(\alpha_2)}{Y}} \right]$$

is a confidence interval for θ with coverage probability $1 - (\alpha_1 + \alpha_2)$.

7. * Consider a random variable Y with density function

$$f_Y(y) = \frac{e^{(y-\theta)}}{\left[1 + e^{(y-\theta)}\right]^2},$$

where $-\infty < y < \infty$, and $-\infty < \theta < \infty$. Use the pivotal method to verify that if $0 < \alpha_1 < 1/2$ and $0 < \alpha_2 < 1/2$, then

$$\left[Y - \log\left(\frac{1-\alpha_2}{\alpha_2}\right), Y - \log\left(\frac{\alpha_1}{1-\alpha_1}\right) \right]$$

is a confidence interval for θ with coverage probability $1 - (\alpha_1 + \alpha_2)$.