Homework 2, STAT764

Due: Sept. 4, 2018

1. Draw the following normal and t density curves on a single plot, with appropriate 'xlab', 'ylab', 'title', 'lty', and 'legend':

(i) standard normal;

(ii) Student's t, df $= 8$;

(iii) Student's t, df $= 28$;

(iv) Student's t, df $= 38$. What would you expect, when df gets larger and larger?

2. Draw a plot with the density curve of a standard normal random variable X and points $\pm c$ such that

$$P(-c \leq X \leq c) = 0.95.$$

What is the value of c?

3. Draw a plot with the density curve of a χ^2_{18} variable X and a point c such that

$$P(X > c) = 0.10.$$

What is c equal to?

4. Run a simulation to verify the following theorem: if $X_1 \sim \chi^2_{n_1}$, $X_2 \sim \chi^2_{n_2}$, and X_1 and X_2 are independent, then $\frac{X_1/n_1}{X_2/n_2} \sim F_{n_1,n_2}$.

5. Run a simulation to verify the following theorem: if $X_1, X_2, \ldots, X_n \overset{i.i.d}{\sim} N(\mu, \sigma^2)$, then $\frac{(n-1)S^2}{\sigma^2} \sim \chi^2_{n-1}$.