

## PROBLEM SET 6

## PROBLEMS DUE FRIDAY 3/17

Do the following problem:

**Problem 1:**

(a) Let  $X \sim N(0, \sigma^2)$ . Derive the following moments of the truncated distribution given that  $a < X < b$

$$E(X|a < X < b)$$

$$Var(X|a < X < b)$$

(b) Consider the following censored regression model:

$$Y_i = \begin{cases} Y_i^* & \text{if } a < Y_i^* < b \\ 0 & \text{otherwise} \end{cases}$$

where the latent variable is given by a linear regression model

$$Y_i^* = X_i\beta_0 + \varepsilon_i$$

where

$$\varepsilon_i|X_i \sim N(0, \sigma_0^2)$$

Compute  $E(Y_i|X_i, a < Y_i^* < b)$  and  $Var(Y_i|X_i, a < Y_i^* < b)$  .. Describe 3 methods of estimating  $\beta_0$  and  $\sigma_0^2$ .