Vanderbilt University
Political Science Department
Fall 2024

Stats 1
(PSCI 8356)
Professor Jim Bisbee

PROBLEM SET 5: Due Friday, September 27th.

A reminder: you may work with others in the class on this problem set, and you are in fact encouraged to do so. However, the work you hand in must be your own. Handwritten work is acceptable, but word-processed work (e.g., using LATEX or `RMarkdown`*) is preferred.*

1. Show that

$$VAR(Y) = \int_{\infty}^{\infty} (y - \mu)^2 dy = E(Y^2) - \mu^2$$

2. Show that

$$P(a < Y_1 \le b, c < Y_2 \le d) = \int_c^d \int_a^b f(y_1, y_2) dy_1 dy_2 = F(b,a) - F(b,c) - F(a,d) + F(a,c)$$

3. Show that, if Y_1 and Y_2 are independent, then:

$$COV(Y_1, Y_2) = 0$$

4. What is $COV(Y_i, Y_i)$?

5. Solve WMS 5.5, 5.11, and 5.79