Homework 5

Due March 29, 2023

Problem 1

Generate 50 pairs of (X, Y) according to the following model:

$$X \sim U[-1, 1], \quad Y|X \sim N(\sqrt{1 - X^2}, 1)$$

1.1

Test the null hypothesis H_0: X and Y are independent using Kendall's τ. Is the null hypothesis rejected at level 0.05?

1.2

Test the same null hypothesis using Spearman's correlation. Is the null hypothesis rejected at level 0.05?

Problem 2

Generate 10 pairs of (X, Y) according to the following model:

$$X \sim U[1, 2], \quad Y|X \sim N(X/2, 1)$$

Test the null hypothesis H_0: X and Y are independent using Kendall's τ and Spearman's correlation. Which method is more powerful in this setting?