UNIVERSITY OF TEXAS AT AUSTIN

Quiz # 14

The χ^2-distribution.

Provide your **complete solution** to the following problems.

Problem 14.1. (5 points) Let the random sample $X_1, \ldots, X_6$ be drawn from a normal distribution with mean 4 and variance 1. Define

$$Y = \sum_{i=1}^{6} (X_i - 4)^2.$$

Using **R**, find the constant q such that

$$\mathbb{P}[Y \geq q] = 0.07.$$

Problem 14.2. (10 points) Let $X_1, X_2, \ldots, X_{11}$ be a simple random sample from a normal distribution with an **unknown** mean μ and a known variance of 2. Let S^2 denote the sample variance.

Using the χ^2-distribution tables, find the constants a and b such that

$$\mathbb{P}[S^2 \leq a] = 0.025 \quad \text{and} \quad \mathbb{P}[S^2 \leq b] = 0.975.$$