

Exam 2

November 13, 2025

1. Suppose that you input in R: `y<-c(2,4,2,3,1,6,7,5,10,1,7)`. Find the following: (a) `y[8]`, (b) `sort(y)[8]`, (c) `quantile(y, 0.5)`.
2. Let $Y_1, \dots, Y_n$ be iid, where each Y has a pdf $f_Y(y) = 24y^{-4}$, $2 < y < \infty$. Find $se(\bar{Y})$.
3. Let $Y_1, \dots, Y_n$ be iid Poisson(9). Find $P(\bar{Y} \leq 8.5)$ for the sample size $n = 36$ (as the last step, should write an R code using `pnorm`).
4. Let Y_{1i} , $i = 1, \dots, n_1$ be iid Exponential(θ_1), let Y_{2j} , $j = 1, \dots, n_2$ be iid Exponential(θ_2), with independence between Y_{1i} 's and Y_{2j} 's. Let $\bar{Y}_1 = \sum_{i=1}^{n_1} Y_{1i}/n_1$ and $\bar{Y}_2 = \sum_{j=1}^{n_2} Y_{2j}/n_2$. If we want to test $H_0 : \theta_1 = \theta_2$ versus $H_A : \theta_1 > \theta_2$, and we know that both n_1 and n_2 are large, please provide the test statistic in this case, along with the corresponding rejection region.
5. Suppose that we have read in a dataset named `exam2` with a column name `Y`, in R. We know that there are less than 30 data points, but there are some missing (NA) values. We want to test $H_0 : \mu = 5$ versus $H_A : \mu \neq 5$, at the level $\alpha = 0.01$. For the fear of making clerical errors, we want to use R to compute both the test statistic and the critical value; please perform these tasks with the information given.