

1. Consider a RIS of size 109 from a distribution with the following pdf

$$f(x) = \begin{cases} \frac{3}{4} \cdot \sqrt{x} & 0 < x < 1 \\ \frac{3}{4} \cdot \sqrt{2-x} & 1 < x < 2 \end{cases}$$

Using Normal approximation, compute the probability that the sample *median* will fall between 0.98 and 1.03. Compare with the exact answer.

2. Consider a RIS of size 7 from $\text{gamma}(3,1.4)$ distribution. Find:

- (a) $\Pr(X_{(3)} < 4.8)$,
- (b) the expected value of $X_{(3)}$ and the corresponding standard deviation.

3. Consider a RIS of size 201 from a distribution with the following pdf

$$f(x) = -\ln x \quad 0 < x < 1$$

Using Normal approximation, compute the probability that the sample *median* will have a value smaller than 0.21. Compare with the exact answer.

4. Using the distribution of the previous question, but reducing the sample size to 9, find:

- (a) $\Pr(X_{(6)} > 0.35)$,
- (b) the expected value of $X_{(6)}$ and the corresponding standard deviation,
- (c) $\Pr(X_{(6)} > 3X_{(2)})$

5. Consider a RIS of size n from $\mathcal{E}(1)$. Find the pdf of the corresponding *sample range* R . Convert it to the pdf of $Y \equiv \exp(-R)$ and identify the resulting distribution.