

Name: Austin DeCicco

NetId: ajd295

Spring 2023 Math 481 Mathematical Theory of Statistics
L8 Worksheet. Order Statistics (8.7)

Find the expectation of the sample minimum for a sample of size $n = 3$ for an exponential population with $\lambda = 6$.

$$\frac{3!}{0! 2!} \int_0^{Y_1} \frac{1}{\lambda} e^{-x/\lambda} dx \cdot f(Y_1) \int_{Y_1}^{\infty} \frac{1}{\lambda} e^{-x/\lambda} dx$$

$$\frac{3}{\lambda} e^{-Y_1/\lambda} \left(e^{-x/\lambda} \Big|_{Y_1}^{\infty} \right)^2 = \frac{3}{\lambda} e^{-Y_1/\lambda} \left(-e^{-Y_1/\lambda} \right)^2$$

$$3Y_1 - 6Y_1 e^{-Y_1/\lambda} = \frac{3}{\lambda} \left(e^{-Y_1/\lambda} \right)^3 = \frac{1}{2} e^{-Y_1/2}$$

$$PDF_{Y_1} = \text{expon}(2)$$

$$E(Y_1) = \int_0^{\infty} \frac{1}{2} e^{-y/2} dy \quad \text{or } \lambda = 2$$

by expon