5.11

Compute the median of an exp(λ) distribution

The P.D.F of exp(λ) distribution is

$$f(x) = \lambda e^{-\lambda x}$$

The C.D.F of exp(λ) is

$$F(X) = \begin{cases} 1 - e^{-\lambda x} & x \geq 0 \\ 0 & x < 0 \end{cases}$$

Since $Q(p) = F^{-1}(p)$

$$Q(p) = \frac{-\ln(1-p)}{\lambda}, \quad 0 \leq p < 1$$

for median $p = 1/2$

$$Q(1/2) = \text{Median} = \frac{-\ln(1-1/2)}{\lambda}$$

$$= \boxed{\ln(2)/\lambda} \quad \text{Ans}$$