EXAM M QUESTIONS OF THE WEEK

Question 10 - Week of September 26

X has a Pareto distribution with parameters α and θ.

Find the density function of the random variable $Y = ln(\frac{X+\theta}{\theta})$, and identify the type of distribution that Y has.

The solution can be found below.

Question 10 Solution

$f_X(x) = \frac{\alpha\theta^\alpha}{(x+\theta)^{\alpha+1}}$ for $x > 0$.

$Y = ln(\frac{X+\theta}{\theta}) = g(X)$

$\rightarrow X = \theta(e^Y - 1) = k(Y)$.

$f_Y(y) = f_X(k(y)) \cdot k'(y) = \frac{\alpha\theta^\alpha}{(k(y)+\theta)^{\alpha+1}} \cdot \theta e^Y = \frac{\alpha\theta^\alpha}{(\theta e^y)^{\alpha+1}} \cdot \theta e^Y = \alpha e^{-\alpha y}$.

This is the pdf of the exponential distribution with mean $\frac{1}{\alpha}$.