UNIVERSITY OF TEXAS AT AUSTIN

Quiz #11

Transformations of random variables.

Please, provide your **complete solutions** to the following questions:

Problem 11.1. (2 points) For a random variable X have the exponential distribution. Then, for a constant $\tau > 0$, the random variable $X^{1/\tau}$ has the Weibull distribution. *True or false? Why?*

Problem 11.2. (7 pts) Let X have the loglogistic distribution. Then, the random variable $X' = 1/X$ also has the loglogistic distribution. *True or false? Why?*

Problem 11.3. (6 points) Once a tunnel drill breaks down, it takes at least a month to get a replacement. The waiting time T to get a new drill after that time has the following cumulative distribution function:

$$F_T(t) = \begin{cases} 1 - t^{-2} & \text{for } t > 1 \\ 0 & \text{otherwise} \end{cases}$$

The resulting cost to the construction company is $X = T^2$. Find the probability density function of the random variable X?