*Stochastic Processes* December 14, 2021
Sharif University of Technology CE 40-695
Dr. H.R. Rabiee

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Time: 20 mins

Name: Std. Number:

# Quiz 6 (Sufficient Statistics, Estimation)

**Questions**

1. (50%) Assuming that $X_1$ to $X_n$ are samples from the following PDF:

$$f(x;\theta) = \frac{1}{\theta^2} x e^{-\frac{x}{\theta}} I_{(0,\infty)}(x), \theta > 0$$

   Where $I_{(0,\infty)}(x)$ is the indicator function for range $(0, \infty)$. Find a one dimansional sufficient statistics.

2. (50%) Assuming that $X_1$ to $X_n$ are samples from the following PDF, and there are no restrictions on $\theta$:

$$f(x \mid \theta) = \begin{cases} e^{\theta - x} & x \geq \theta \\ 0 & x < \theta \end{cases}$$

   Find maximum likelihood estimation for $\theta$.