1. Let $X \sim U[0,1]$. Find the distribution of $Y = -2\ln(X)$.

2.

2.

The joint p.d.f. of **x** and **y** is defined as

$$f_{xy}(x, y) = \begin{cases} 6x & x \geq 0, y \geq 0, x + y \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

Define $\mathbf{z} = \mathbf{x} - \mathbf{y}$. Find the p.d.f. of **z**.

3.

x and **y** are independent uniformly distributed random variables in $(0, 1)$. Let

$$\mathbf{w} = \max(\mathbf{x}, \mathbf{y}) \qquad \mathbf{z} = \min(\mathbf{x}, \mathbf{y})$$

Find the p.d.f. of (a) $\mathbf{r} = \mathbf{w} - \mathbf{z}$, (b) $\mathbf{s} = \mathbf{w} + \mathbf{z}$.

4.

Let **x** and **y** be independent Poisson random variables with parameters λ_1 and λ_2, respectively. Show that the conditional density function of **x** given $\mathbf{x} + \mathbf{y}$ is binomial.