Transformations

1. Find the PDF of $Y = e^{-X}$ for $X \sim \text{Exp}(1)$ in two different ways. Can you name it?

2. Find the PDF of $Y = |Z|$ where $Z \sim N(0, 1)$.

3. Suppose we have two continuous RVs X_1, X_2 with joint distribution

$$f_{X_1,X_2}(x_1, x_2) = 4x_1x_2 \qquad 0 < x_1 < 1 \text{ and } 0 < x_2 < 1$$

   We are interested in the following transformations: $Y_1 = \frac{X_1}{X_2}$ and $Y_2 = X_1X_2$. Find the joint PDF $f_{Y_1,Y_2}(y_1, y_2)$. Don't forget the support (maybe both draw it out and define a set. It's going to be a little weird!).

4. Continuing from 3, find the marginal distribution of Y_1 using your joint PDF f_{Y_1,Y_2}. Be careful with support!