

# MECH 6325 Hw 1

14)  $X = Y = \begin{cases} 1, & X = [0, 1], Y = [0, 1] \\ 0, & \text{otherwise} \end{cases}$   
 $\checkmark$   
Independent

$$Z = |X - Y|$$

$$\begin{aligned} f_Z(z) &= \iint f_{X,Y}(x,y) dx dy = \iint_{y=0}^1 \int_{x=0}^1 |x-y| dx dy \\ &= \int_{y=0}^1 \int_{x=0}^y (y-x) dx dy + \int_{x=0}^1 \int_{y=0}^x (x-y) dy dx \\ &= \int_0^1 \frac{y^2}{2} dy + \int_0^1 \frac{x^2}{2} dx \end{aligned}$$

$$f_Z(z) = \begin{cases} 1, & z = [0, 1] \\ 0, & \text{otherwise} \end{cases}$$