CSE 250B: Section 1 - Sharad Vikram

1. Let X and Y be binary random variables ($X, Y \in \{0, 1\}$). Given the following, calculate $\mu(x)$ and $h(x)$:

$$\begin{aligned} P(Y = 0) &= 0.3 \\ P(Y = 1) &= 0.7 \\ P(X = 1|Y = 0) &= 0.4 \\ P(X = 1|Y = 1) &= 0.9 \end{aligned}$$

2. You are given the following for $x \in [0, 1]$:

$$\eta(x) = \begin{cases} 0.9 & x \leq 0.5 \\ 0.4 & x > 0.5 \end{cases}$$
$$\mu(x) = 2x$$

   a) What is $h^*(x)$?

   b) What is R^*?

   c) What are h^* and R^* if $\mu(x) = 1$?

3. Prove that the following function is a distance metric:

$$d(x, y) = \max_i(|x_i - y_i|)$$