

Question 3

Suppose that X is a random variable whose entropy $H(X)$ is 8 bits. Suppose that $Y(X)$ is a deterministic function that takes on a different value for each value of X .

Part 1: What is the entropy of Y ?

Solution

Since the values are unrelated to the info or the entropy, easy to see that

$$H(X) = 8\text{bits} = H(Y)$$

Answer

$$H(Y) = 8\text{bits}$$

Part 2: What is the joint entropy $H(X, Y)$?

Solution

Similarly, since both entropies are the same, we have

$$H(X, Y) = H(X) = H(Y) = 8\text{bits}$$

Answer

$$H(X, Y) = 8\text{bits}$$