Information Theory
Problem Set 06 - Dependent Random Variables

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1. (a) $H(X,Y)$ is the joint entropy of X and Y. It means how much information, on average, each of the joint outcomes carries. ON onther words, is the expected value of information of the joint outcomes from ensembles X and Y.

$$H(X,Y) = \sum_{xy \in \mathcal{A}_x \mathcal{A}_y} P(x,y) log \frac{1}{P(x,y)}$$

   (b) $H(X|Y)$ is the conditional entropy of X given Y. It represents the average information infomration content of X given each $y \in \mathcal{A}_y$.

$$H(X|Y) = \sum_{xy \in \mathcal{A}_x \mathcal{A}_y} P(x,y) log \frac{1}{P(x|y)}$$

   (c) $I(X,Y)$ is the mutual information between X and Y.

   (d) d

2. (a) a

   (b) b

   (c) c

3. 3

4. 4

5. 5

6. 6

7. 7

8. 8