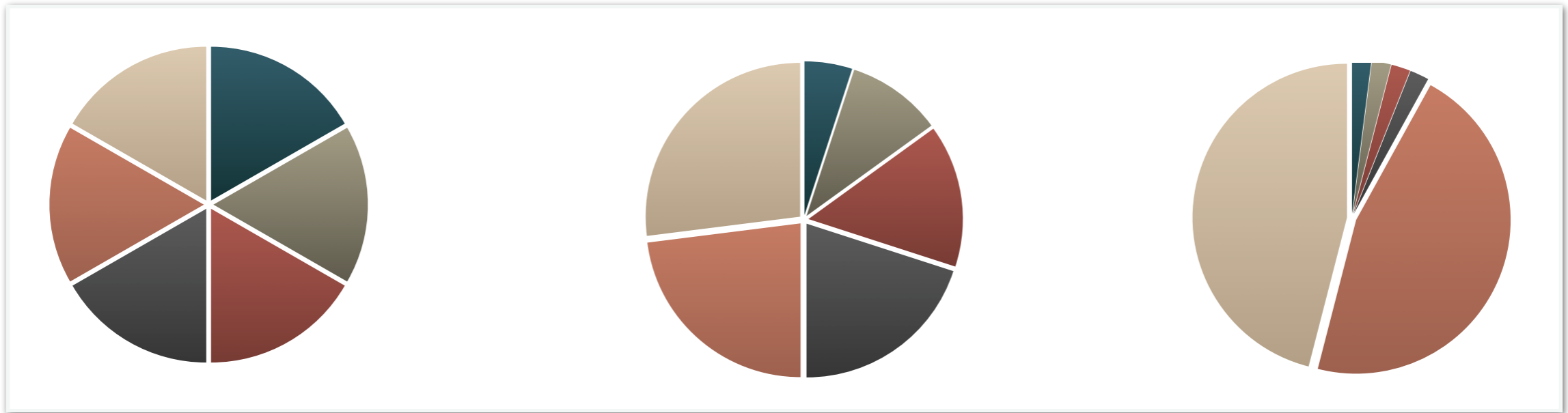


Order These in Terms of Entropy



Order These in Terms of Entropy



Mutual Information and Entropy

Theorem: Relationship between mutual information and entropy.

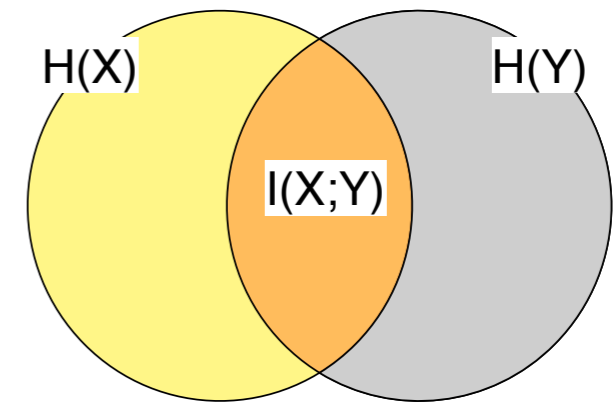
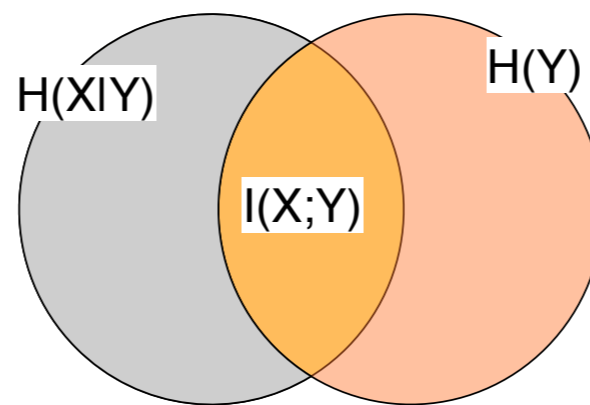
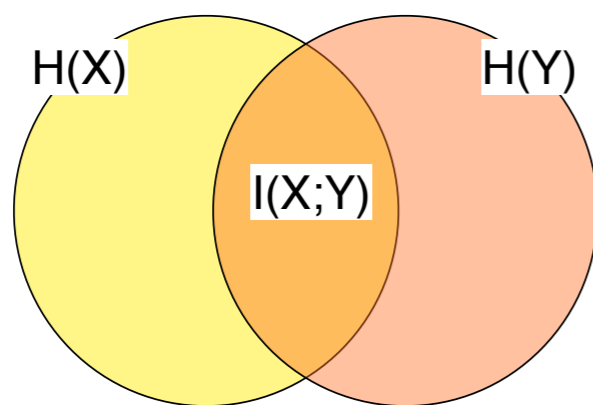
$$I(X; Y) = H(X) - H(X|Y)$$

$$I(X; Y) = H(Y) - H(Y|X)$$

$$I(X; Y) = H(X) + H(Y) - H(X, Y)$$

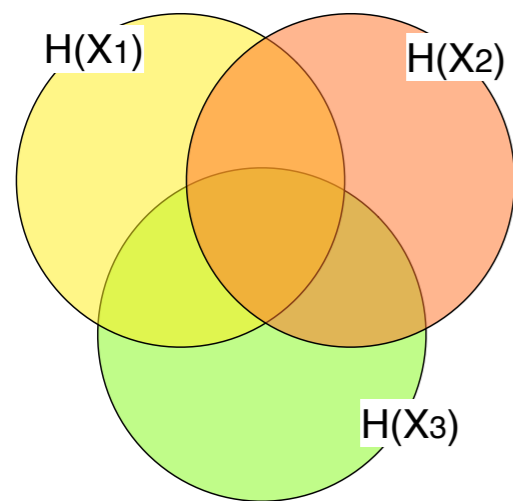
$$I(X; Y) = I(Y; X) \quad (\text{symmetry})$$

$$I(X; X) = H(X) \quad (\text{“self-information”})$$

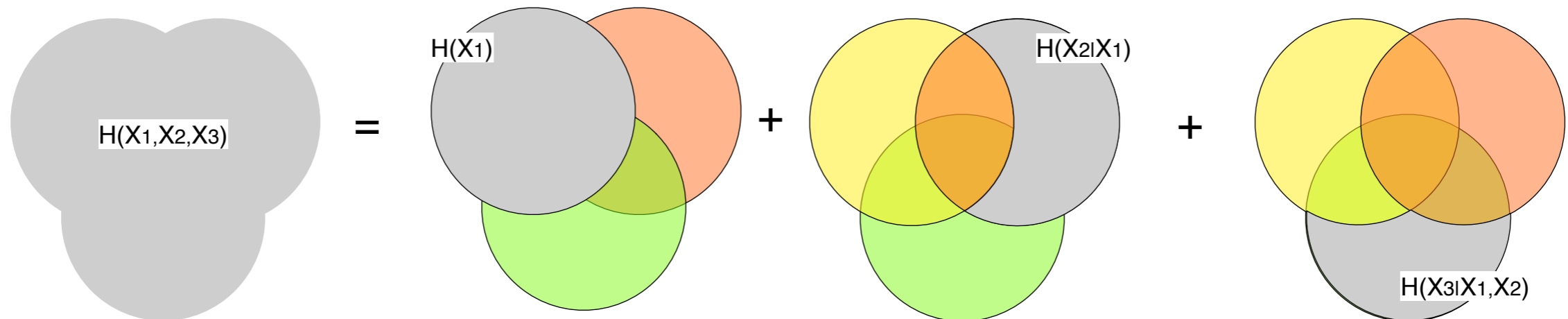


Chain Rule for Entropy

Theorem: (Chain rule for entropy): $(X_1, X_2, \dots, X_n) \sim p(x_1, x_2, \dots, x_n)$



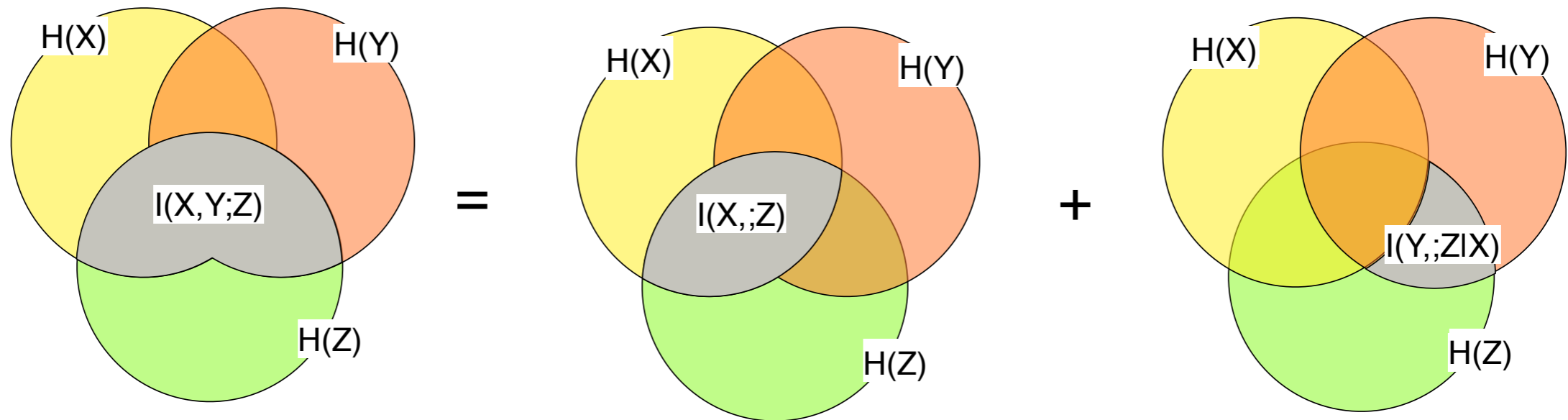
$$H(X_1, X_2, \dots, X_n) = \sum_{i=1}^n H(X_i | X_{i-1}, \dots, X_1)$$



Chain Rule for Mutual Information

Theorem: (Chain rule for mutual information)

$$I(X_1, X_2, \dots, X_n; Y) = \sum_{i=1}^n I(X_i; Y | X_{i-1}, X_{i-2}, \dots, X_1)$$



What are the Grey Regions?

