King Fahd University of Petroleum & Minerals

Electrical Engineering Department EE430: Information Theory and Coding (072)

Quiz 1

KEY

Name:

1

Serial #

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- 2 points for not writing your serial number

Given two information sources with |A|=2, |B|=2. The joint probabilities of symbols from these sources are given in the following table.

- 1. Find H(A), H(B), H(A,B), H(B|A), H(A|B). (6 p)
- 2. Sketch a Venn diagram to illustrate the calculated quantities. (2 p)
- 3. What is the value of $H(A) \cap H(B)$ and what does is it represent. (2p)

$$H(A) = H(0.6, 0.4)$$

= 0.6 $\log_2(\frac{1}{0.6}) + 0.4 \log_2(\frac{1}{0.4})$
= 0.9710 bits

	b0	<i>b1</i>	
a0	0.4	0.2	0.6
al	0.1	0.3	σ. 4
0.5 0.5			

$$H(B) = H(0.5, 0.5) = 1.8464 \text{ bis}$$

 $H(A, B) = H(0.4, 0.2, 0.1, 0.3) = 1.8464 - 0.9710$

$$H(B|A) = H(0.4, 0.2, 0.1, 0.3)$$

 $H(B|A) = H(A,B) = H(A) = 1.8464 - 0.9710$
 $= 0.8754$ bits

$$H(B|A) = H(A,B) - H(B) = 0.8737$$
 $= 0.8737$
 $= 1.84(4 - 1)$
 $= 0.84(4 - 1)$
 $= 0.84(4 - 1)$

H(A,B) 2) H(BIA) H(B) 14(A)

$$H(A) \qquad H(B) = I(A;B) = H(A) - H(A|B)$$

$$= 0.9710 - 0.84(4)$$

$$= 0.1246$$

$$= 1 - 0.8754$$

$$= 0.1246$$

It is the mutual common to the two