EE606: Topics in Communications

Prof. Kondi

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**Homework #3**

**Due:** Friday October 26, 2001

**Problem 1**

A source source emits symbols $s_0, s_1, s_2, s_3$ and $s_4$ with probabilities 0.55, 0.15, 0.15, 0.10 and 0.05, respectively.

(a) Find the entropy of the source in bits/symbol.

(b) Find a Huffman code for this source and calculate the average codeword length. Comment on the relationship between entropy and average codeword length.

**Problem 2**

A source emits symbols $s_0, s_1, s_2, s_3, s_4, s_5$ and $s_6$ with probabilities 0.25, 0.25, 0.125, 0.125, 0.0625 and 0.0625, respectively.

(a) Find the entropy of the source in bits/symbol.

(b) Find a Huffman code for this source and calculate the average codeword length. Why is the average codeword length equal to the entropy of the source?

**Problem 3**

Show that for the (7,4) Hamming code described in class, the syndrome cannot be used to detect or correct two or more transmission errors in the received codeword.