The University of Texas
ARLINGTON

EE5351 – DIGITAL VIDEO CODING

INSTRUCTOR: Dr. K.R. Rao

Summer 2009, Exam 1

Tuesday, 23 June 2009

1:00PM – 2:00 PM (1 Hour)

(OPEN ONLY CLASS NOTES)

INSTRUCTIONS:

1. Open ONLY class notes.
2. Calculator is allowed.
3. Please show all the steps in your work.
4. You can work problems in any order.
   At the end please rearrange as 1, 2, and 3 (4–8 are multiple choices).
5. Please print your name and student ID.
6. No cheating, no talking.

Name_____

Student ID_____

[Problem 1]

A source emits letters from an alphabet $\mathcal{A} = \{a_1, a_2, a_3, a_4, a_5\}$ with probabilities $P(a_1) = 0.15$, $P(a_2) = 0.04$, $P(a_3) = 0.26$, $P(a_4) = 0.05$, and $P(a_5) = 0.50$.

(a) Calculate the entropy of this source.

(b) Find a Huffman code for this source.

(c) Find the average length of the code in (b) and its redundancy.

[Problem 2]

Given the probability model in the table below, find the real valued tag for the sequence $a_1\ a_1\ a_3\ a_2\ a_3\ a_1$.

Letter	Probability
a_1	.2
a_2	.3
a_3	.5

Table: Probability model for problem 2

[Problem 3]

Given an initial dictionary consisting of the letters *a b r y* ␣, encode the following message using the LZW algorithm: *a␣bar␣barray␣by␣barrayar␣bay*.