Homework 4: (Chapter 3 Entropy)

Chapter 3 Exercises: 3.1, 3.2, 3.3 (16%)

Exercise 3.1 (6%)
A source S has probabilities $p_i = 0.3, 0.2, 0.15, 0.1, 0.1, 0.08, 0.05, 0.02$. Find $H_2(S)$ and $H_3(S)$, and compare these with the average word-lengths of binary and ternary Huffman codes for S (see Exercise 2.7).

Exercise 3.2 (6%)
For each q ≥ 2, give an example of a source S with q symbols, and an instantaneous binary code C for S attaining the lower bound L(C) =$H_2(S)$.

Exercise 3.3 (4%)
A source S has probabilities $p_i = 0.4, 0.3, 0.1, 0.1, 0.06, 0.04$ (Exercise 2.3). Calculate the entropy of S, and hence find the efficiency of a binary Huffman code for S.