ECE 729: HOMEWORK 10, DUE DEC 7.

Consider a source random variable $X$ with the Hamming distortion measure.
(a) Prove that $R(D) \geq H(X) - D \log_2(|\mathcal{X}| - 1) - h(D)$ for $0 \leq D \leq D_{\text{max}}$.
(b) Show that the above bound is tight if $X$ is distributed uniformly on $\mathcal{X}$.
(c) Can the bound fail to be tight for $D = 0$? Comment on what this means regarding compression.