Practice Problem Set 5 - Basics of Information Theory

1. (Cover & Thomas) Let $X = 1$ with probability p and $X = 0$ with probability $1 - p$. Plot $H(p)$ vs p.
2. (Cover & Thomas) Prove $H(X, Y) = H(X) + H(Y|X)$.
3. (Cover & Thomas) Let (X, Y) have the following joint distribution.

	X:1	2	3	4
Y: 1	1/8	1/16	1/32	1/32
2	1/16	1/8	1/32	1/32
3	1/16	1/16	1/16	1/16
4	1/4	0	0	0

   Compute $H(X), H(Y), H(X|Y), H(Y|X), H(X, Y)$.

4. What would be the leave-one-out cross-validation squared error estimate for least-squares on the data set below (x is one-dimensional)?