HW I (due Sept 18th, before tutorial)

Course webpage: `http://perso.ens-lyon.fr/omar.fawzi/teaching/it/index.html`

1. (Repetition code) Suppose that you have a disk drive where each bit gets flipped with probability $f = 0.1$ in a year. In order to be able to correct errors, we take a copy of the full drive $N-1$ times so that we have N copies of the original data (N is odd). After one year, I would like to retrieve a given bit of the original drive. What should I do? Suppose I want the probability of error for this bit to be at most δ, how large should I take N as a function of δ? How large is this for $\delta = 10^{-10}$?

2. Let $X \in \mathbb{N}$ be a discrete random variable and $g : \mathbb{N} \to \mathbb{N}$. What can you say in general on the relation between $H(X)$ and $H(g(X))$? And in particular, if $g(n) = 2^n$?