22. Suppose the family \( g = \{ g_n \}_{n \in \mathbb{N}} \), where \( g_n : \{0, 1\}^n \rightarrow \{0, 1\}^{n+1} \), is a pseudorandom generator. Suppose \( k > 1 \) is a constant. Based on \( g \), construct a pseudorandom generator \( h = \{ h_n \}_{n \in \mathbb{N}} \) where \( h_n : \{0, 1\}^n \rightarrow \{0, 1\}^{n^k} \), and prove that your construction works. [2 points]

23. Suppose \( x \in \{0, 1\}^n \) is an unknown \( n \)-bit string. A helper reveals to us the bits \( x \odot r_i \) (for \( 1 \leq i \leq n \)) where the strings \( r_1, \ldots, r_n \in \mathbb{R} \{0, 1\}^n \) are chosen uniformly at random, and independently. Describe a deterministic algorithm that successfully reconstructs \( x \) from this information, with probability at least \( 1/4 \). Note: \( x \) is fixed, and the probability is only over the choice of \( r_i \)s. [2 points]

Hint: Linear algebra over the finite field \( \mathbb{F}_2 \) works much the same as linear algebra over the reals.