General rules:

1. Let $A$ be a random subset of $\{0, 1\}^n$ chosen uniformly at random. Find the best $\delta$ (in the big O notation) so that with high probability $|\hat{A}(\emptyset) - \frac{1}{2}| \leq \delta$ and for every $S \neq \emptyset$, we have $|\hat{A}(S)| \leq \delta$.

2. Construct a $2^n \times 2^n$ matrix $A$ such that $Af = \hat{f}$.

3. Let $f : \{0, 1\}^n \times \{0, 1\}^n \rightarrow \mathbb{R}$. What are the eigenvalues and eigenvectors of the $2^n \times 2^n$ matrix with entries $f(x \oplus y)$?

4. Construct a Boolean function whose total influence is $O(\log n)$ but all its variables have non-zero Fourier coefficients.

5. 1.1(n), 1.11 of O’Donnell’s book.

6. 2.4, 2.18, 2.21, 2.46, 2.55, 2.57 of O’Donnell’s book.