Exercise #3

Goal  For some $\varepsilon = O\left(\frac{d}{\sqrt{n}}\right)$
\[
agr_{\leq 2d}(f) \geq \left( \mathbb{E}_{s \in S_k^{k+1}} \left( agr_{\leq d}(f_s) \right) \right) - 3 \leq \varepsilon \]
proved in class

For some $\varepsilon = \left(\frac{d}{\sqrt{n}}\right) \cdot O(1)$
\[
agr_{\leq d}(f) \geq \mathbb{E}_{s \in S_k^{k+1}} \left( agr_{\leq d}(f_s) \right) - 3 \leq \varepsilon
\]

4 Lemmas + conclude

1. LDT Thm

success of test $\Rightarrow$ some agreement with low deg

You should prove that there exist few low degree poly that explain almost all the success of the test.
different notion of "explaining": \( \Pi(s) \equiv P_{1s} \) (Note: correction)

agreement on the entire subspace, rather than on a point.

[Diagram of a probability space with intersections labeled as list agree on part, list agree on sub., and test passes.]

understand prob. of events & their intersections

2. Agreement increase
   
   II. almost everything is explained by short list

   III. Is it possible that within \( S \) agreement with \( \Pi \) is small, yet average over \( S \) the agreement with \( \Pi \) is large?

   I. If only the weak LDT Thm is correct, then on average over \( S \), agreement with \( \Pi \) is small.
Degree decrease

$q \in F_{\leq \deg \{x_1, \ldots, x_m\}}$

restrict $q$ to random $sc S_{k+1}^k$

What is the degree of $q|_S$? Can it be $< \deg q$ with non-negligible probability?