$\Leftrightarrow \quad \{P_i \leq p_i = 1 - F_i(d_i)\} = D_i'$

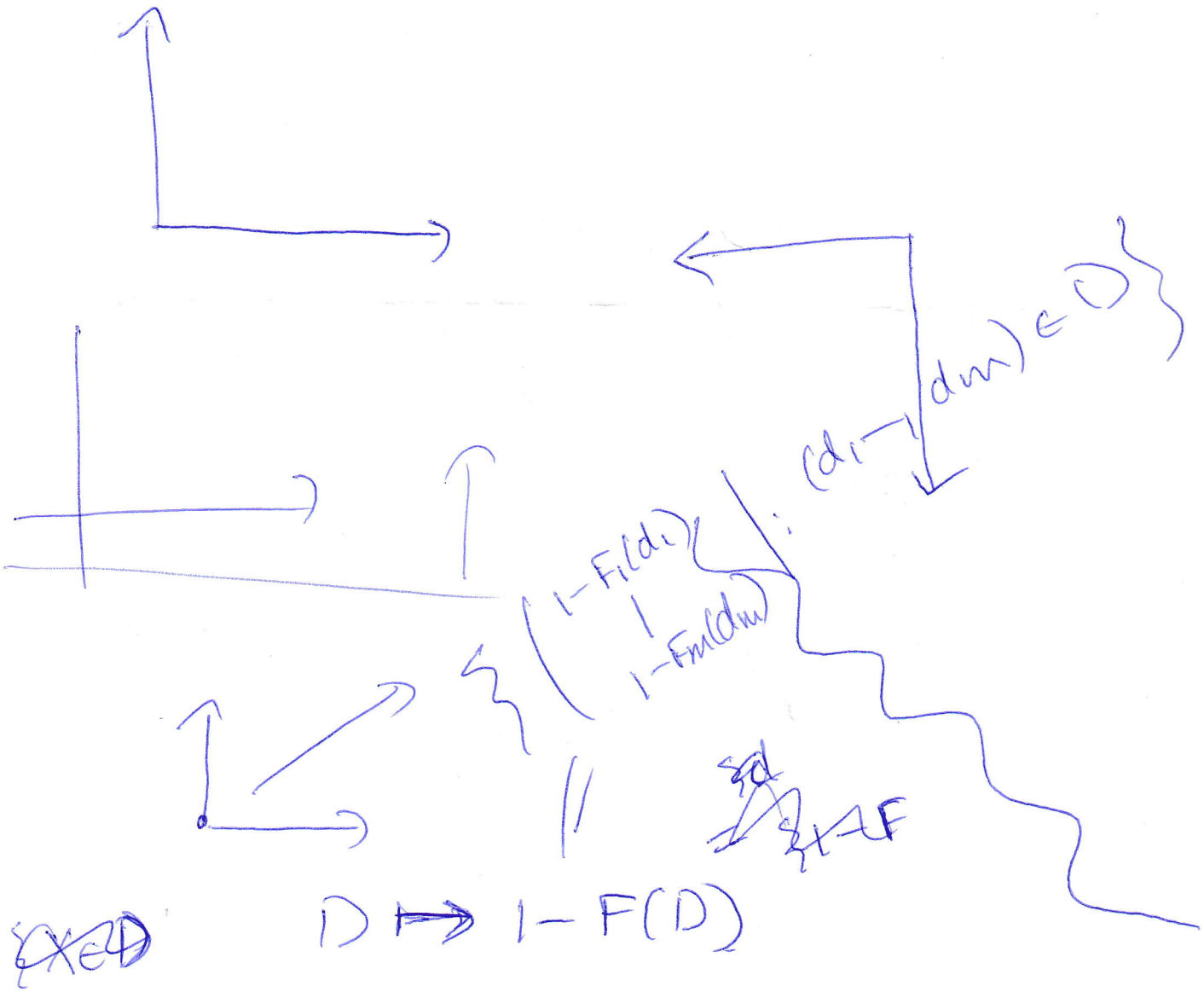
note in P_i D_i is decreasing.

so $D = \bigcap D_i'$

ie $P_i = P \; 1 - F_i(\cdot)$

$\Pi(P \in \bigcap D_i' \mid X_i = x)$ is increasing in x

so is decreasing in P



$D \mapsto 1 - F(D)$

$X \in D \Leftrightarrow P \in 1 - F(D)$