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Aspiration: Reusable techniques for similar problems.

Strategy: Identify structure over source distribution via duality; carry it to sample.

$$\inf \left\{ \text{ Logistic loss of } f : f \in \operatorname{span}(\mathcal{H}) \right\}$$

$$\inf\left\{\int \ell(-yf(x))d\mu(x,y): f\in \operatorname{span}(\mathcal{H})\right\}$$

$$\inf\left\{\int \ell(-yf(x))d\mu(x,y): f \in \operatorname{span}(\mathcal{H})\right\}$$
$$= \max\left\{\operatorname{Fermi-Dirac\ entropy\ of\ } p$$

• When $\ell : \mathbb{R} \to \mathbb{R}_+$ is nondecreasing, β -Lipschitz,

$$\inf\left\{\int \ell(-yf(x))d\mu(x,y): f \in \operatorname{span}(\mathcal{H})\right\}$$
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$$: p \text{ has capped weights,}$$

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- ▶ Rate m^{-c} ; c depends on \mathcal{H} and $\mu \stackrel{\sim}{\frown}$.

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- γ_{ϵ} lower bounds progress; rate $\mathcal{O}(m^{-1/3})$.