L173 Pre-reading response for session 2

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Read *Generative adversarial nets*, Goodfellow et al. 2014, §§1–4. Write a short response, about half a page pdf, answering these questions. LLM usage is permitted.

1. Proposition 1 gives the optimal discriminator $D^*_G(x)$. Write down its logit, $\log D^*/(1-D^*)$. The proof assumes the discriminator sees equally many real and generated samples; say where that assumption enters.

2. State equation (5) in the course's notation, q for the truth and p_θ for our model, for the variant in which the discriminator sees real and generated samples in proportion π to $1-\pi$.

3. In lecture 1, our target was $\mathrm{KL}(q \,\|\, p_\theta)$. What arguments does the paper give in favour of using (5) rather than our target? Comment.

The questions are mostly about judgement, and ask you to read between the lines or think about the paper's unstated premise, or explain an argument that is implied rather than directly stated. You get the marks for interpretation and engaging critically with the paper, not for simply repeating what it says.

Be concrete. For example, point to a specific passage, equation, or figure, say why it matters and what it does. Use the course's notation, not the paper's. Answer from the papers and the lectures; facts brought in from elsewhere earn no marks, however true. Engaging critically means setting the paper against the lectures, not against the later literature.