Advanced Deep Learning - Assignment 2

In this assignment, you will examine the performance of diffusion models samplers performance in terms of efficiency and quality.

- You need to train a denoising diffusion model (e.g. DDPM, and EDM) on the FahsionMNIST dataset (alternatively you can use AFHQ resized to 32x32) . Implement the code yourself from scratch.
- The baseline diffusion model should be trained using 200 diffusion steps.
- Test and compare the following samplers on the model you trained:
    - The vanilla sampler.
    - DPMSolver++: https://arxiv.org/abs/2211.01095
    - FastDPM: https://arxiv.org/abs/2106.00132
    - DDIM: https://arxiv.org/abs/2010.02502
- Compare the four sampling methods quantitatively using the FID score (you may use this code for FID score). Compare the methods when used for 200 steps, 50 steps, 10 steps, and 5 steps.
- Test the four methods above on stable diffusion 2.1 and compare them qualitatively (no need to compute FID). Compare the methods when used for 100 steps, 50 steps, 10 steps, and 5 steps, on the same input text prompt.