Aidan Flaherty, Henry Ye, Sam Park **U3 Problem Set: ML and Optimization**

Part 1.
Describe how CycleGAN may be applied to a semi-supervised image segmentation task. That is, we want to perform image segmentation with very few labeled images but a lot of unlabeled images.

Part 2.
Perform this task on the Cityscapes dataset. For the training set, use a split of 2975 images in the Cityscapes training set, containing both coarse and fine annotations, and the Cityscapes val set for testing. Use the Intersection-over-Union (IoU) metric on the labeled data to track training and testing. Treat the finely annotated images as labeled and other images an unlabeled.

Use a U-Net to create the generator networks. Use 7 downsampling and upsampling blocks, with the last 2 downsampling and upsampling blocks not changing the number of channels.

For the discriminator, use a 70×70 PatchGAN, described in the original pix2pix paper. The specific architecture for this task is outlined in the appendix of the original CycleGAN paper.

Part 3.
How could this method be improved? Note that we are currently only evaluating the model using adversarial losses.