**Context & Instructions (30 Minutes)**

You are a data scientist working for Boston Blue Bikes. As part of an operational improvement initiative, you have been asked to develop a predictive model that can accurately forecast, at the outset of a particular bike rental, how long the customer’s rental will last (i.e., the rental/trip duration). To ensure bike availability, your predictive model will inform logistics within the bike network, e.g., the reallocation of bikes across/between rental stations. Your manager has provided you with a sample of historical data on bike rentals, including customer details, geographic information, rental timing, and the rental duration.

Go train a neural network to implement this prediction task!

**Conceptu­­­al Questions**

1. Try to draw a visual representation of the neural network you implemented (like the diagrams I have shown you in class, depicting the input layer, hidden layers, and output layer). Can you check how many trainable parameters your network includes?
2. What loss function did you use with your neural network? Why did you choose this loss function? What activation function did you use in the output layer? Why did you choose this activation function?
3. Choose any other activation function (one you did not use) and explain why that activation function would have been just as good, or a bad choice in this setting.
4. Imagine your prediction task has changed, and your objective is not to predict trip duration, but instead to predict trip *destination* (i.e., the station to which the customer is most likely to return their bike). What activation and loss functions would you use for that alternative prediction task?
5. What external datasets might you want to incorporate here to expand your predictor set and improve predictions? Are there any predictors in this dataset that you *should not* use? Why?