1. Provide an example of a problem that can be addressed using econometrics, machine learning, and deep learning. (20 points)  
     
   A company wants to know what features of a car have a significant impact on the car’s price. The features being analyzed would be car color, engine type (V6, V8, diesel, electric), number of doors, model type(sports, minivan, sedan, etc.)
2. Answer the following questions carefully:  
     
   a. Why this problem can be address by all the 3 models? what is unique about the type of the data set (hint: structured vs unstructured) 10 points  
     
   The dataset for this problem would be structured. If the data is structured, all 3 types of models can be used, but an econometrics model will perform better because we are looking for high interpretability.   
     
   b. Write down a simple econometrics model for your problem in this format y=b0 + b1 X1 + b2 X2 + ... + u (20 points)  
     
   Price = b0 + b1 color + b2 engine\_type + b3 doors + B4 model\_type
3. Provide an example of a problem that can be addressed only using deep learning techniques. (20 points)  
     
   Correctly identify the type of tree or plant from a camera picture to use in a hiking app.
4. Answer the following questions carefully:  
     
   a. Why this problem can be address only by a deep learning models? what is unique about the type of the data set (hint: structured vs unstructured) 10 points  
     
   The dataset for this example is using unstructured data. Deep learning models can make predictions better for unstructured data of an image if the dataset provided is large. Econometrics models are better used for model interpretation with less complexity of the number of inputs. Using machine learning would still be difficult because you would have to manually change the features to find a solution for a particular image.   
   Deep learning models will be able to learn to differentiate between images faster because of the automatic feature engineering aspect of the deep learning model.   
     
   b. What are the complications if you decide to use machine learning for this problem of yours? (20 points)  
   If I used a machine learning, I would have to manually change my features for each image that is tested. There will be some similarities in the images, but it becomes computationally difficult to manually account for several possible differences of an image in a machine learning model.