Please answer the questions below as follows:

- Answers must be in written form in a Word document. If needed, supplement with figures but keep the answers short.
- A Python notebook (Jupyter notebook or similar) with a clear heading for each of the problems. Clean up the code and keep it as short and tidy as possible. Remove anything that is not relevant.
- Time limit: 8 hours or less

QUESTIONS:

1. Items ordered from an e-commerce website will be shipped from the store and dropped off at a hub, where it is then picked up by another truck, who delivers it to the final destination. The hub has two trucks coming and picking up all the available shipments (no limit on loading space). The first truck always arrives on the hour (i.e., 1:00, 2:00, 3:00, etc.). The second truck arrives x minutes after the hour, where x is a random number between 0 and 60 (i.e., 1:00 + x, 2:00 + x, 3:00 + x, etc.) Let's assume that a shipment is dropped off at the hub at a random time. What is the average time that the shipment will wait at the hub before getting picked up? Write a program that computes the average waiting time using a simulation.

2. Download the open dataset https://catalog.data.gov/dataset/supply-chain-shipment-pricing-data.

   a. Plot the distribution of freight costs and compute the average cost together with 5 and 95 percentiles. Explain what assumptions you made.
   b. Plot the number of delivered shipments over time. You can use weeks, months or another unit of time.
   c. What other observations can you make about the data?
   d. Fit a model of your choice to the freight cost. Explain what assumptions you made and answer the following questions:
      i. Which variables (if any) are good predictors of the freight cost?
      ii. How good is your model?