

# Monte Carlos Long Term Prediction

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# Background

You have received a request from the CEO to understand when we'll need to build a second line production plant to meet increased demand for XYZ. To answer this question, you've begun researching and discovered the following:

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- 1) XYZ is served in 10,000 restaurants today
  - 2) Every month 200-1000 new restaurants start serving XYZ but 0.5-1% of existing restaurants stop serving
  - 3) Each restaurant buys an average of 50 lbs of burger per week and this average increases randomly by 0% to 2.5% each week
  - 4) Every week the plant can produce a random amount of burger between 1 million and 1.5 million lbs
  - 5) The factory freezer can store up to 3 million lbs of burger indefinitely and currently has 1 million lbs stored
  - 6) The second production line would double production capacity
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# Monte Carlos Simulation Method

**Build Functions**



**Monte Carlos Simulation**

**Generate Demand, Supply  
and Storage lists**

### **Step 1: Build Function**

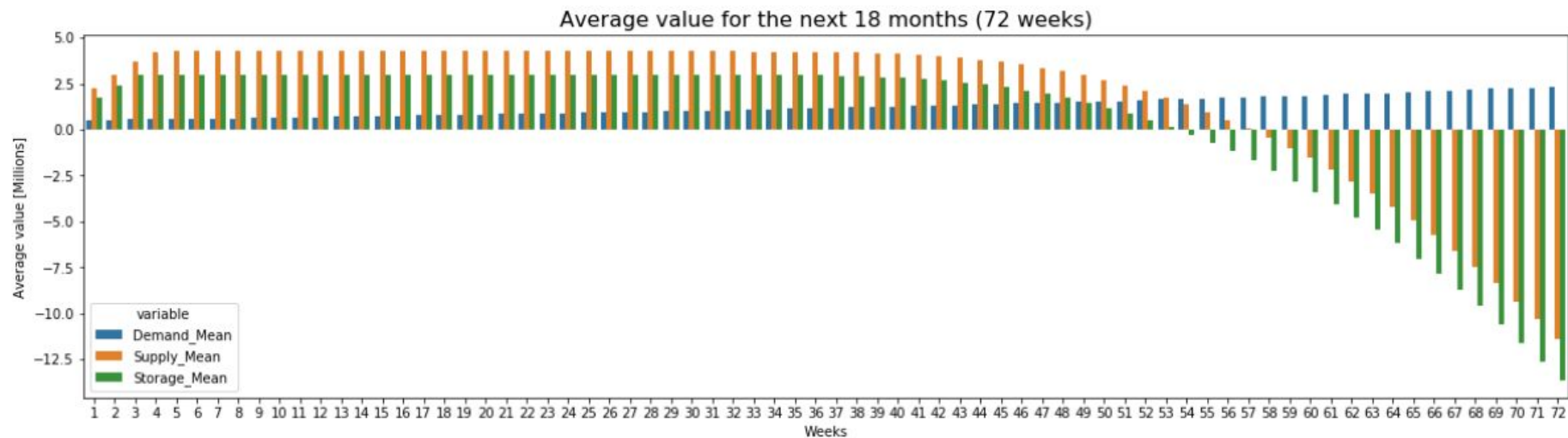
- 1) Build a function to compute weekly customer numbers using two uniform distributions: monthly customer increase and monthly customer stop serving rate;
- 2) Build a function to calculate the weekly demand, supply and storage;

### **Step 2: Generate lists**

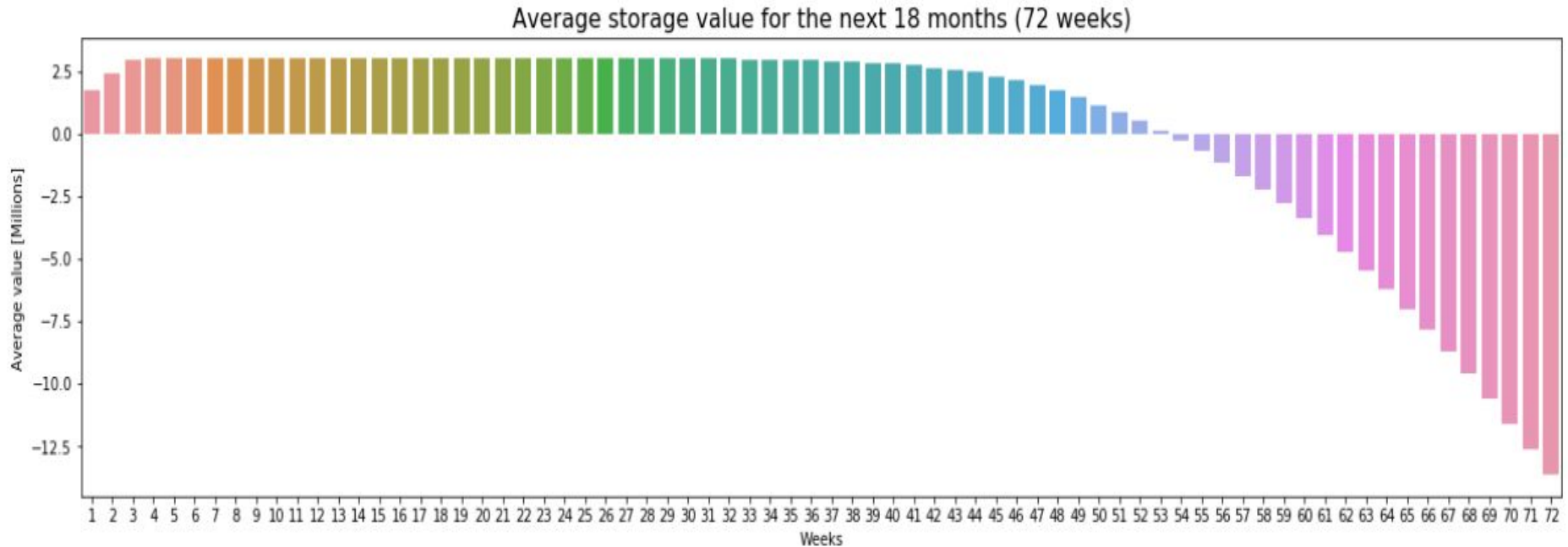
- 3) Use the above function to get 3 lists of 72 ( $18 * 4$ ) weeks' value for demand, supply and storage;
- 4) Generate 2 lists of 18 monthly values for monthly customer increase and monthly customer stop serving rate, generate 2 lists of 72 ( $18*4$ ) weekly value for weekly customer demand increase rate and weekly production value;

### **Step 3: Monte Carlos Simulation mean and standard deviation**

- 5) Implement Monte Carlo simulation 5000 times, and calculate the mean value and standard deviation of 5000 time's Monte Carlos iteration for demand, supply and storage
- 6) Calculate the 90% and 99% confidence intervals and use the lower bound values to find the shortage week and month



# See shortage week: 54th





There is not big difference between 90% and 99% lower bound value

