Estimated Product Demand For SPS

## Background

SPS retail manufacturing company is interested to find out whether stores are likely to run out of stock for any of its products in the next seven days. Client has two weeks of data for various stores and products available. Client would like a summary of products that will likely run out of stock the following week.

## Recommendation

Based on our analysis and assumptions, we recommend that the following products be supplied for corresponding stores in order to meet the likely demand that we expect to see in the coming week.

## Data Assumptions

* Demand for each product follows a Poisson distribution.
* All products are always available for delivery to individual stores from distribution center.
* A product spends a day in transit from distribution center to store. When a product is shipped from distribution center, it will be available the next day in store.
* Daily product demand is calculated as previous day’s stock reduced by current day’s stock plus any products in transit.

## Data Discrepancy

* For some stores, product quantity in stock were negative. These stores were excluded from this analysis.
* For some stores, calculated daily demand were negative. A common cause was a sudden jump in stock quantity. This may have resulted from returns or some other reason. These stores will be excluded from this analysis until the cause can be clarified and accounted for.

## Analysis

After preliminary data management process, the resulting dataset includes product quantity in stock and transit for the two hundred sixteen distinct store and product combinations. For each store and product combination, the mean daily demand was calculated using data from previous two weeks. Individual mean values served as lambda values for Poisson distribution used to simulate demand for next week.

Weekly demand was simulated for N iterations.

2. For each store/product combination, calculate the mean daily demand and use this number as your Poisson parameter.

3. For each store/product combination, calculate the probability (using Poisson simulation) that the store will run out of stock in the next seven days. (Have a probability for each of the seven days.)

4. Based on the data, comment on how realistic the two-day transit assumption is.