OM 386 Data Driven Health Care Operations

Individual Assignment #3 - ***Shawn Kalish***

Spring 2022

**Problem 1:**

Prob(Success)

= Prob(S­­­­1&S2&S3**|**P1)Prob(P1) + Prob(S2&S3**|**P2)Prob(P2) + Prob(S3**|**P3)Prob(P3)

= (0.1)(0.15)(0.25)(0.33) + (0.15)(0.25)(0.33) + (0.25)(0.33)

= 0.0961125

The overall probability that the drug will be successful is roughly 9.6%



**Problem 2:**

Chart, bubble chart

Description automatically generated



**Problem 3:**

The profits increase for both the manufacturer and distributor with a buyback contract because with that contract the manufacturer shares in the risk. Because of that, risk decreases for the distributor, so they are slightly less concerned about demand and are able to order more which increases the manufacturer’s profits. Consequently, overage cost for the distributor decreases so their profits increase as well.

**Problem 4:**

q\* = F-1( = F-1( = 0.375

x\* = qnorm(0.375, 600, 150, lower.tail = TRUE)

x\* ≈ 553

**Problem 5:**

1. q\* = F-1( = F-1( = 0.75

Looking at the eCDF table, the first demand value that has a larger eCDF than 0.75 is

25,000, so that is the optimal quantity.

1. q\* = F-1( = F-1( ≈ 0.54

Looking at the eCDF table, the first demand value that has a larger eCDF than 0.54 is 18,000, so that is the optimal quantity.

1. The optimal order quantities are different in part 1 & 2 because in part 2 there is a 30% probability that the entire order will not arrive on time. It only makes sense that the optimal order quantity is lower, reflecting that uncertainty.

**Problem 6:**

pi\_mean[q\_opt] = $2,519.39







On the next page you will find the plots of the three profit functions. The results are as follows:

* **When h = 0**
  + q\_opt = 1371
  + opt avg price = $2,519.39
* **When h = -0.5 \* c**
  + q\_opt = 1506
  + opt avg price = $2,647.38
* **When h = 0.5 \* c**
  + q\_opt = 1280
  + opt avg price = $2,414.90

When holding cost is 0, nothing changes. When holding cost is negative, optimal quantity and profit are higher because leftover products create income. When holding cost is positive, optimal quantity and profit are lower because the company is charged for leftover products.

**h = 0**

Chart, line chart

Description automatically generated

**h = -0.5 \* c**

Chart, scatter chart

Description automatically generated

**h = 0.5 \* c**

Chart, line chart

Description automatically generated