**BA 353: OCAs 8 & 9**

**OCA 8 a)** Consider an inventory system with normally distributed demand with mean 1000 and standard deviation 100 – in other words, demand is usually around 1000 units but typically varies by about 100. Assume that the shortage cost – what it costs if you run out of products – is $20 and that the holding cost varies as in the table below. Use the inventory simulation spreadsheet online to hunt for the best base-stock level and associated cost in the table by changing cells B10, C10 and D10. Try to find the best base-stock level to approximately the nearest 10 and round the best cost reasonably. ~~the best cost to the nearest $100.~~

|  |  |  |
| --- | --- | --- |
| **Holding Cost** | **Base-Stock Level** | **Cost** |
| $20 |  |  |
| $10 |  |  |
| $5 |  |  |
| $1 |  |  |
| $0.10 |  |  |

When the holding cost and shortage cost are equal, what’s the best base-stock level? Does this make sense?

As the holding cost decreases (from $20 down to just $0.10), what happens to the base-stock level? Does this make sense?

As the holding cost decreases, what happens to the cost?

**OCA 8 b)** Reconsider the same problem but now vary the standard deviation. Assume the mean demand is still 1000, the shortage cost is still $20, and use $5 for the holding cost. Let the standard deviation – how much uncertainty there is in the system – vary from 1 up to 500 as in the table below

|  |  |  |
| --- | --- | --- |
| **Standard Deviation** | **Base-Stock Level** | **Cost** |
| 1 |  |  |
| 10 |  |  |
| 25 |  |  |
| 100 |  |  |
| 500 |  |  |

What happens to the base-stock level and cost as the standard deviation, the variability of the system, increases from very low (1) to insanely unstable (500)?

**OCA 9)** Consider an inventory system with mean demand 5000 and standard deviation 600. Assume the holding cost is $1. In this system, if a shortage occurs, instead of backordering and charging a shortage cost, they run overtime production to avoid the shortage. (I actually did my Ph.D. on something like this, I know, I’m cool.) Overtime production is *expensive:* regardless of how many units need to be produced, there is a fixed cost of $500 and there is a per unit overtime production cost of $5. Determine the approximate best base-stock level and the associated cost for this system. [Hint: You’ll need to update the cost functions in columns F, G and H.]