MMA 863 Practice Problems from Scope of Assignment 3

These practice problems reflect some of content in assignment 3. Since these problems are for practice, we can discuss them on the discussion board, in office hours and I will provide solutions.

For each of the problems below, calculate the relevant probabilities, draw an approximate picture of the distributions involved and note any assumptions you have to make where appropriate.

1. (Demonstration of Testing in Excel) Using data on the Gasoline\_Prices tab:
   1. Test H0: Mu\_Downtown <= 121
   2. Test H0: Mu\_Downtown >= 121
   3. Use a test at alpha = 5% that H1: Highway is cheaper than Downtown
      1. Unpaired
      2. Paired
2. There are two hotels in Toronto that I can stay at, let’s call them A and B. They offer similar loyalty programs that offer more perks the longer you stay – and as a frequent hotel guest, getting the most from the hotel loyalty program is all I really care about. So I want to commit to staying at one of them for the next two years, and my company does not care which hotel I stay at even though they pay the bill.

So here is the thing: At the end of the year if I stay at hotel A they will give me 5% of my cumulative bill back in cash; hotel B will only give me 4% back. (This may sound like bribery, but I am assured that this is all perfectly legal – don’t ask me why, I try to avoid questioning things like this.)

I have been staying at hotel A for so long, I know the average room price is $223 / night. I have asked hotel B for a series of 36 nights of stays, and they have provided it. The data is on the tab ‘hotels’.

I have been staying at hotel A, but perhaps it is time for a change. Using the method from class, construct the best hypothesis test you can to help me make decision. Use an alpha of 1%. Be sure to clearly develop your hypotheses using the method from class. Use the data on the tab ‘hotels’ to actually run the test and make a recommendation on what I should do. Be sure to note required assumptions if any are required.

1. Boring: The file ‘Boring Data’ contains information on the useful life of a sample of mining drill bits, which is to say, how long they performed before they became too dull. Your boss is convinced that drill bits do not last long enough but suspects he needs more information to prove this to his supplier, he would like to be 99% confident in his claims and would like this issue resolved soon. Using the information provided:
   1. How large a sample would be required to estimate the proportion of drill bits that last less than 20 hrs within 3%? Retain and post any rough work done in Excel in a single file with the rest of your rough work at the end of the exam.
   2. Briefly explain your conclusions to your manager along with any choices you made if any.