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1. Similar to Question 2 in the previous lab, collect the data of option prices on some of the stocks that are included in NIFTY index. Choose the stocks such that they are from different industries and are already included in your database “nsedata1”. The data should comprise of closing prices of calls and puts of various maturities and strike prices. Put all these data in an Excel file and name it as “stockoptiondata”.
  2. Consider the data of option prices on NIFTY and on stocks stored in the Excel files “NIFTYoptiondata” and “stockoptiondata”. Take the current time to be  $t = 0$  and  $S_0$  to be the current index level or the current stock price. Assume  $r = 5\%$ .
    - (a) Plot the option prices (for both call and put) for a range of maturities and strike prices in three dimension. (Your plot axes are option price, maturity and strike price). If you visualize the above plot in two dimensions (option price vs. strike and option price vs. maturity) what do you observe ?
    - (b) For each maturity and each strike, compute the implied volatility from the BSM formula using the appropriate root-finding method (*eg. Newton-Raphson method*).  
Plot the implied volatilities against strike price and maturity in three dimensions. What are your observations if you examine the plot in two dimensions (implied volatility vs. strike and implied volatility vs. maturity) ?
    - (c) Estimate the historical volatility for the same period for which you have estimated the implied volatility. How do the two volatilities compare ? Present your results in tabular and graphical forms.  
*Note that when you are computing the historical volatilities, you have to take data starting from  $t = 0$  and going back in time for a period equal to the maturity of the option.*