

Download the daily adjusted closing stock prices of State Bank of India, for the period of 1st July 2020 to 30th September 2020, from the following URL on Yahoo Finance:

<https://finance.yahoo.com/quote/SBIN.NS/history/>

Set the log-returns as,  $u_i := \ln \left( \frac{s_i}{s_{i-1}} \right)$ , where  $s_{i-1}$  and  $s_i$  are the closing stock prices of day  $i - 1$  and day  $i$ , respectively.

If the stock prices follow the gBm model of,

$$ds(t) = \mu s(t)dt + \sigma s(t)dw(t),$$

then the estimate of  $\mu$  and  $\sigma$  can be obtained by solving,

$$\mu - \frac{\sigma^2}{2} = \frac{1}{n} \sum_{i=1}^n u_i := E(u), \text{ and } \sigma^2 = \frac{1}{n-1} \sum_{i=1}^n (u_i - E(u))^2,$$

where  $n$  is the number of values of the  $u_i$ 's.

### Problem Statement:

- (1) Using the estimated values of  $\mu$  and  $\sigma$ , generate 1000 possible values of the stock prices and then calculate the expected values of the stock prices, for the following dates, and tabulate the **three** calculated expected values of the stock prices.
  - (a) 7th October 2020.
  - (b) 14th October 2020.
  - (c) 21st October 2020.
- (2) Determine the percentage error in the **three** calculated expected values of the stock prices, in Part (1), compared to the actual realized values of the stock prices, on the corresponding dates, and tabulate the **three** values of the percentage error.

---

***Submission Deadline: 28th October 2020, 11:59 PM***