

1. Write a single program to compute the prices of European call and put options at time  $t$  for  $0 \leq t \leq T$  in the classical BSM framework. Denote the call and put prices by  $C(t, s)$  and  $P(t, s)$  respectively, with  $s$  being the price of an underlying asset.
2. Assume  $T = 1, K = 1, r = 0.05, \sigma = 0.6$ . Plot, in a single graph,  $C(t, s)$  as a function of  $s$  alone for  $t = 0, 0.2, 0.4, 0.6, 0.8, 1$ . Do a similar plot for  $P(t, s)$  as a function of  $s$ . Now, show the same information in a 3-dimensional form, i.e., as a function both  $t$  and  $s$ .
3. Plot  $C(t, s)$  and  $P(t, s)$  as a smooth surface above the  $(t, s)$ -plane.
4. Study the sensitivity of both the functions  $C$  and  $P$  as a function of model parameters. If required, you may assume different parameter values as opposed to the one given above. Present your results in the form of tables and graphs (both in two and three dimensional).

Put all your observations in the report.

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**Submission Deadline: 12th March 2025, 11:59 PM**