

Individual problem set – do not work on with classmates. Submit each question in a separate worksheet in a single Excel file.

1. Consider the example presented in the CapletDeriv1.xlsm class spreadsheet.
 - (a) Compute the implied volatility from Black's lognormal model for the future 90-day Libor rate in this example.
 - (b) Plot the equivalent risk neutral cumulative distribution function and the probability density function of this future rate under the assumptions of Black's lognormal model.
 - (c) Discuss the difference between the distributions of this future Libor from the two alternative models.
2. Refer to the interest rate scenario and swap in Problem Set 6. We will consider a cap that is struck at the swap rate with a 5-year term and the same parameters as the swap, comprising 19 caplets, with notional principal of \$10 million. The lognormal vols for the caplets are: Caplets 1 - 3: 0.685; Caplets 4 - 7: 0.58; Caplets 8 - 11: 0.44; Caplets 12 - 15: 0.812; and Caplets 16 - 19: 1.260. For this cap, you can make the payment date the same as the expiry / reset dates, (rather than 2 business days delayed.)
 - (a) What is this cap's flat vol according to the lognormal model?
 - (b) What is this cap's flat vol according to the normal model?
 - (c) Consider a collar – the same side in a cap and a floor – in this case. What is the value of a collar with cap strike of 55 basis points, and floor strike of 15 basis points.