AVM Programming Exercise: Swap Curve

Aim of the exercise

Please write a program to accomplish the following task in C#, C++, or Java. Please make sure the code is well structured, and clearly commented.

Assumptions

The following IBOR par swap rates are observed on the market. The rate resets semi-annually.

Maturity	Swap Rate (%)
6M fixing	4.11
1Y	4.14
2Y	3.73
3Y	3.48
5Y	3.21
7Y	3.11
10Y	3.08

Questions

1. If the discount curve has a flat spread of -38 bps over the IBOR curve, please generate the reset and discount curves with the following assumptions:

    a. Float leg reset/pay semi-annually, and fixed leg pay annually.
    b. No business day adjustments.
    c. No spot lag (Zero spot lag).
    d. Use actual days to calculate time in years (Actual/Actual).

2. For a 9Y par plain vanilla swap starting from today, calculate the swap fixed rate, DV01 and Gamma.

3. 3 months later, assume the curve is the same, calculate the accrual, and clean PV for the same swap.

4. Use cubic spline interpolation to construct the spot swap rate curve by assuming f(0) = f(6m), and f''(0)= f''(10y) = 0. And then use this spot curve and the discount curve created in question 1 to recalculate the accrual and clean PV in question 3.