MATH4511 Quantitive Methods for Fixed Income Derivatives, 2015-16 Fall
Quiz 03(T1C)

Name: ____________________ **ID No.:** ____________________ **Tutorial Section:**______

1. (20 points)

yield	bond price	option price
4.99%	100.078	3.1871
5.00%	100	3.1501
5.01%	99.9221	3.1134

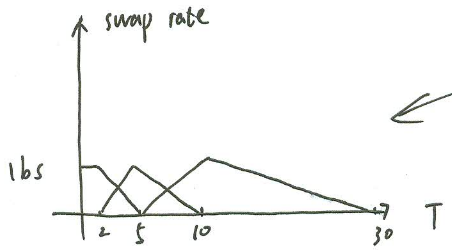
(1) According to the table above, calcalate the DV01 and duration of the bond option with yield 5%.
(2) How to hedge a short position of this bond option (face value $1m) by using the bond to make the portfolio "DV01 neutral" and "Duration neutral" respectively?

(1) DV01 = 0.03685

Duration = 116.98.

(2) FV of this bond = $1m × 0.4727.

2. (10 points) Calculate the 2-year, 5-year and 10-year KV01 of a 10-year swap (face value $1m). Assume the par yield curve is flat at 6%.



procedure:

① key rate shift

② Calculate new discount curve.

③ $KV01^k$ = ~~Value of~~ old value − new value.

3. (20 points)

A: a 10-year zero-coupon bond;

B: a portfolio of 2-year and 30-year zero-coupon bond with weights 0.8 and 0.2.

Suppose the current yield curve is flat at 3%. Compare the duration and convexity of A and B.

Duration of A: $\frac{T}{1+\frac{y}{2}} = \frac{9}{1+\frac{3\%}{2}} = 9.85$

Duration of B: $0.8 \times \frac{2}{1+\frac{3\%}{2}} + 0.2 \times \frac{30}{1+\frac{3\%}{2}} = 7.488.$

Convexity of A: $\frac{T(T+0.5)}{(1+\frac{y}{2})^2} = \frac{10(10.5)}{(1+\frac{3\%}{2})^2} = 101.919.$

Convexity of B $0.8 \times \frac{2(2.5)}{(1+\frac{3\%}{2})^2} + 0.2 \frac{30(30.5)}{(1+\frac{3\%}{2})^2} = 181.5137.$