

Fixed Income  
Problem set 1 on VBA

**Problems: Show all work. Clearly indicate your answer to each question.** For the purposes of this problem set assume that any 6-month period is exactly one-half of a year, any 3-month period is exactly one-fourth of a year, etc. Short answer: Be precise and concise.

Here is the VBA function I wrote to compute the value of a coupon bond on its issue date or a coupon payment date:

```
Function BondVal(Term, y, crate)
CF = 50 * crate
TV = 100
V = 0
npmts = Term * 2
For per = 1 To npmts
    df = Exp(-y * 0.5 * per)
    V = V + df * CF
Next per
BondVal = V + TV * df
End Function
```

1. Add a module to a new spreadsheet with this function, and verify that it works.
2. Suppose that you enter 18 for Term, .10 for y, and .05 for crate. What will the value of the variable per be when the code gets to the *BondVal* line? Have the subroutine print this out to the spreadsheet.
3. Add another module that uses the yield to maturity on a bond equivalent basis to compute the bond value – in this function *y* is the continuously-compounded yield to maturity on the bond. Build a function where *y* is the bond's yield to maturity on a bond equivalent basis.
4. Write a subroutine to compute DV01 using both duration and numerically of a standard coupon bond on a coupon payment date or issue date.
5. Write a subroutine that produces a mortgage amortization schedule. Take the mortgage value, number of payments per year, interest rate, and mortgage term as inputs through an argument list. Compute the periodic mortgage payment, and store each of the following in a separate vector: the interest portion of the payment each period; the principal portion of each payment; and the principal remaining after each payment. Write out the amortization schedule with the following 4 columns: Period; interest; principal; and remaining principal, into a spreadsheet.
6. Write a subroutine that reads the following spot rates from a spreadsheet: 0.25, 0.5, 0.75, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, and 5- year terms. (Make up your own rates.)
  - (a) Have your subroutine compute the missing rates on a quarterly basis using linear interpolation. Store all 20 spot rates in a vector.
  - (b) Have the subroutine compute all 90-day forward discount factors from these spot rates. Store these in a vector.
  - (c) Have the subroutine write out a cash flow schedule of the quarterly payments on a 5-year floater with quarterly resets and quarterly tenor, using the forward rates as reset rates.

Quiz notes: Obviously on a quiz you can't implement your code. I will provide a sample that contains examples of the necessary syntax, and ask you what the values of the variables will be given different inputs, how to modify the code, or write different code.