Name: _______________________

MA 3211 - 2010 B Term

December 6, 2010    Chapter 4 quiz

For this quiz, you are given:

\[
(Ia)_{n\|i} = \frac{\ddot{a}_{n\|i} - n v^n}{i} \quad (Da)_{n\|i} = \frac{n - a_{n\|i}}{i}
\]

\[
(Is)_{n\|i} = \frac{s_{n+1\|i} - (n + 1)}{i} \quad (Ds)_{n\|i} = \frac{n(1 + i)^n - s_{n\|i}}{i}
\]

- Please write your name on the first and last page of this quiz.
- For all questions, show your work. No credit will be given if you don’t show your work. If you are confused by something, write down what you know or think about the problem – the more you share with me how you are approaching the problems, the easier it is for me to assess whether you understand the concepts.
- Time lines, whether horizontal or vertical (tabular form) are quite helpful, for you to think about and for me to see!
- Please express final answers that are interest rates (including force of interest) as percentages, with four decimal places (so 0.0123456 would be shown as 1.2346%).
- Annuity factors should be expressed with four decimal places, and dollar amounts shown to two decimal places, unless otherwise indicated.
1. Calculate each of the following.

   a. \[ \left( Ia \right)_{\overline{x}|i=6\%} \]

   b. \[ \bar{a}_{[5]} \text{ where } d^{(\infty)} = 6\% \]
2. Circle one of the two choices inside each of the twelve square brackets noted by “[ ]” below:

- If I write a call, I am [ long / short ] the call, and I have [ bought / sold ] insurance against a price [ increase / decrease ] in the underlying asset*

- If I purchase a put, I am [ long / short ] the put, and I have [ bought / sold ] insurance against a price [ increase / decrease ] in the underlying asset*

- If I purchase a call, I am [ long / short ] the call, and I have [ bought / sold ] insurance against a price [ increase / decrease ] in the underlying asset*

- If I write a put, I am [ long / short ] the put, and I have [ bought / sold ] insurance against a price [ increase / decrease ] in the underlying asset*

* Note the insurance only comes into play when the price of the underlying asset crosses the strike price of the call or put
3. Create an amortization schedule for a three year 12% $10,000 bond sold to yield 8%
4. A 10-year 8% $1,000 bond is sold to yield 6%.
   a. What is the price of the bond?

b. Five years later, immediately following the tenth coupon payment, the bond is sold for $1,040 to a new investor who desires a k% yield rate. What is k%?
5. You buy a 20-year 8% annual coupon $1,000 bond, sold to yield 7%, and reinvest all proceeds from this bond in a bank account which earns a 4% nominal semiannual rate. What is your overall yield rate after twelve years?
6. A 20-year $100,000 12% bond redeemable at $K sells at a premium, and has $255.01 principal repaid in its 20\textsuperscript{th} coupon and $510.02 principal repaid in its 34\textsuperscript{th} coupon. Determine $K.
7. An n-year 5% bond is selling for 987.49. An n-year 6% bond at the same yield would sell for 1076.22. The face and redemption amount of the bond is 1000. What is the yield rate?
**Bonus Question**

You purchase a $10,000 perpetual bond which pays a 10% annual coupon (forever). Each time you receive a coupon from the perpetual bond, you will use it purchase a 10 year 6% annual coupon bond at par. What is your yield rate if you paid $10,300 for this perpetual bond?
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