Homework 5 - Due 21 September 2011
Math 1140 Financial Mathematics

Collaboration Policy: You are encouraged to collaborate with your fellow students on this homework. You must turn in individual solutions and you are not allowed to use any written, typed, or recorded artifact from the meeting with your classmates.

Pledge: On my honor, I pledge that I have neither given nor received unauthorized aid on this assignment.

Name(use block letters):

Signature:

For full credit you must show your work and your calculations for all the problems. I am not asking for the presentation of silly arithmetic!

If you solve all the bonus problems you are not required to turn in the textbook problems (problem 1). I encourage you to check you can actually solve them.

Problem 1 (Not required if you solve all other problems, including the bonus problems.)

Page 47, exercises 10, 12
Page 50, exercises 8, 14
Page 54, exercise 14
Page 56, exercise 8
Page 73, exercises 28, 32
Page 76, exercises 12, 14

Problem 2

a) Is a high price of a T-bill good or bad for the US Government? Justify your answer with an explanation why.
b) Is a high price of a T-bill good or bad for the investor buying the bill? Justify your answer with an explanation why.

Problem 3

Read the news article *Treasury 3-Month Bill Rates Drop to Lowest Since World War II*, from 2008, at
`http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a21pnk8Qb_.0`
and explain in a couple of paragraphs why the 3-months T-bill rates are low.
For a more recent development check
`http://articles.boston.com/2011-06-28/business/29713556_1_3-month-t-bill-tr`

Note: One sentence is not enough. For full credit, I expect you to present the reasons given in the news article for the low rate and whether you agree or not with the position.

Bonus problems on the back

Problem (Bonus 1)

Given a simple interest loan, prove that when at least one partial payment is made the balance calculated using the US rule is higher than the balance calculated using the Merchant's Rule.
Hint: Let *n* be the number of partial payments. First, prove it for $n = 1$. Then try to prove it for a general *n*.
Note: If you can't do it for general *n*, solve it only for $n = 1$.

Problem (Bonus 2)

Prove that the discount rate is smaller than the coupon equivalent.

Note: I want you to show that $i = \frac{d}{1-dt} \geq d$.

Problem (Bonus 3)

Is the the discount yield(bank discount rate) of a T-bill going up or down when the price is going up? Justify your answer with an explanation why.

Problem (Bonus 4)

a) As you may have learned from the news, on 5 August 2011, S&P downgraded the United States credit rating from the best rating AAA, to a lower AA+. This means that lending money to US is considered riskier than before. What should have had happen with the T-bills and T-notes price?

b) Since then the price of T-bills and T-notes went up (the bank discount rate went down). How can you explain this?

Problem (Bonus 5)

In September 2011, the discount yield of Greece's Government Bond reached a historical high of 18.28%. At the same time the 10-years T-note reached a record low yield (see `http://tinyurl.com/454sotd` or search for *10-year Treasury yield hits record low* on `http://money.cnn.com`). Since both the Greek bonds and US T-notes are auctioned, why are the investors still buying US T-notes?