

# Homework 8 - Due 21 October 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. You are allowed to use any resources **except for the Appendix D in the textbook (the solutions to the odd-numbered exercises).**

**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!**

### Problem 1

Use the geometric series formula

$$1 + x + x^2 + \cdots + x^n = \frac{x^{n+1} - 1}{x - 1}$$

to calculate or give the formula for:

- a)  $1 + x + x^2 + \cdots + x^{n+1}$
- b)  $1 + x + x^2 + \cdots + x^{n-1}$
- c)  $x + x^2 + \cdots + x^n$
- d)  $1 + x^3 + x^6 + x^9 + \cdots + x^{3n}$
- e)  $x^{-1} + x^{-2} + \cdots + x^{-n}$
- f)  $x^{-2} + x^{-4} + \cdots + x^{-2n}$

### Problem 2

Alice borrows  $P$  dollars at an interest rate  $i$  per month. Assume Alice makes a monthly payment,  $R$ . Is there a problem if the monthly payment  $R$  is less than the interest per month,  $iP$ ?

### Problem 3

Assume a \$20,000 credit card debt and an effective rate of 15%.

- a) What is the minimum yearly payment that will cover the interest?
- b) If the yearly payment does not exceed this minimum, what happens to the debt?

### Problem 4

Jan borrows \$40,000 at 12%(2) for her college education and wants to repay it within ten years by making semiannual payments. Find the semiannual payment.

**Problem 5**

Emil is buying new appliances for his kitchen and finds a double oven which costs \$800. After a \$200 down payment it can be financed over one year with monthly payments at a rate of only 1.4%(12). Find Emil's monthly payments.

**Problem 6**

How many quarters will it take a deposit of \$100 per quarter at 6%(4) to a) to accumulate close to \$5,000, but not go over (payments less than \$100 are not allowed) b) to accumulate at least \$5,000 (payments less than \$100 are not allowed) c) to accumulate exactly \$5,000, the last payment will be less than \$100. Find the final payment.

**Problem 7**

How long will it take Alice if she is depositing \$250 per month into an account paying 5.1%(12) to accumulate \$15,000 for buying a new car?

**Problem 8**

At what rate of interest will \$100 per month be worth \$2,500 in two years?

**Problem 9**

If you buy a \$10,000 car by making 24 \$500 monthly payments, what is the rate you are being charged?

**Problem 10**

What is the APR for an 8% add-on loan for \$3,000 for three years?

**Problem 11**

A \$9,000 car is purchased using a 4% add-on loan and monthly payments over three years. What is the actual APR?

**Problem Bonus 1**

A \$10,000 loan for 36 months at 6%(12) is arranged for the customer to make payments  $R$  for the first year,  $2R$  for the second year, and  $3R$  for the third year. Find the payments for each of the three years.

**Problem (Bonus 2)**

John wants to save \$28,000 in eight years. He plans to deposit \$2,000 per year for five years and \$3,000 per year for the last three years. What rate will he need to be able to have the desired amount?