Math 107
Saving Plans for the long term

YOUR NEW CAR:

You really want to buy a new car in 5 years! The cost of your dream car is $23,000. Being highly sensible you do not want to take out a loan on the car and instead you are looking at investing some money now. One option available to is to a invest a large sum of money now and just let it grow for 5 years. This type of investment is called a lump sum investment.

For example, how much would you need to invest now if you can get 10% compounded monthly and would like to have $23,000 in five years:

If you solved this correctly you should need $13,979.14. While this is kind of impressive (after all you earn $9020.86 in interest) If you are like most of us, you do not really have $13,979.14 hanging around for her to invest. Instead, you look at your monthly budget and decide you can save $300 per month for the next five years. You will then plan to use this towards the purchase of your new vehicle. How much will you have in five years?

Notice this is NOT a lump sum payment – instead it is a PERIODIC PAYMENT – meaning you make a payment to the plan at a certain point in time (like monthly or yearly) called a period. We can develop a formula – which is complicated – or we can use Excel and in class I will show you how to do this

Example: Suppose you can invest $300 per month and for five years and you get an interest rate of 10% compounded monthly. How much will be in the account after five years

Here is a snippet of an Excel spreadsheet. See if you can reproduce and extend this spreadsheet to solve the above problem.

	Month	Principal	Interest	Deposit	New Principal at end of month
1					
2	1	$ -		$ 300.00	$ 300.00
3	2	$ 300.00	$ 2.50	$ 300.00	$ 602.50
4	3	$ 602.50	$ 5.02	$ 300.00	$ 907.52
5	4	$ 907.52	$ 7.56	$ 300.00	$ 1,215.08
6	5	$ 1,215.08	$ 10.13	$ 300.00	$ 1,525.21
7	6	$ 1,525.21	$ 12.71	$ 300.00	$ 1,837.92
8	7	$ 1,837.92	$ 15.32	$ 300.00	$ 2,153.24

Note that every month the interest is calculated *before* the deposit is made.

The problem above asks you know how much you will have in a certain time period, if you know the periodic payment. However often we have to answer another question – **what periodic payment will I need to make if I want a certain amount of money in the future?**

THE CASE OF THE MILLIONAIRE

You really want to retire a millionaire. You figure you would like to retire at age 65 and have $1,000,000 saved at that time. You are 21 years old now and finds an account that pays 8% compounded monthly in which he can make monthly payments. What should his monthly payment be in order to have this $1,000,000 by the time he is 65

You can solve this problem in Excel with a guess and check method.

Some Practice Problems

Example: At age 35 you decide to start saving for retirement. If your investment plan pays 6% per year and you want to have 1 million when you retire in 30 years, how much should you deposit monthly

Example: You want to save $100 per month for a down payment on a car. You hope to purchase the car in 24 months. You invest this in an account that pays 8% compounded quarterly. How much will have in the account at the end of 24 months?