**FIN 440 LECTURE 6**

**time value of money**

**CHAPTER REFERENCE – CHP 5**

***Future Value - single amounts***

**FV = PV (1 + i)n**

**FV = PV (FVIF i, n )**

**FV = PV (1 + i/m) m x n**

**FV = PV (e i x n)**

***Present Value - single amounts***

**PV = FV / (1 + i)n**

**PV = FV (PVIF i, n )**

* In every single sum future value and present value problem, there are 4 variables:
* FV, PV, i, and n
* When doing problems, you will be given 3 of these variables and asked to solve for the 4th variable.
* Keeping this in mind makes “time value” problems much easier!

**Annuity:** A STREAM OF EQUAL PERIODIC CASH FLOWS

***Future Value – annuity***

**FVA = PMT (FVIFA i, n )**

**FVA = PMT X (1 + i)n - 1**

 **i**

***Present Value – annuity***

**PVA = PMT (PVIFA i, n )**

 **\_1\_\_**

**PVA = PMT 1 - (1 + i)n**

 **i**

**deferred annuity**

**discount annuity – then calculate single amount**

**Present Value of a Perpetuity**

**PVA = PMT**

  **i**

***Future Value - annuity due***

**FV = PMT (FVIFA i, n ) (1 + i)**

***Present Value - annuity due***

**PV = PMT (PVIFA i, n ) (1 + i)**

**Mixed streams of cash flows**

A series of single amounts – same formulae

***Annual Percentage Yield (APY)***

**APY = ( 1 + quoted rate ) m - 1**

 **m**

**PRACTICE PROBLEMS**

1. If you deposit $100 in an account earning 6%, how much would you have in the account after 5 years?
2. If you deposit $100 in an account earning 6% with quarterly compounding, how much would you have in the account after 5 years?
3. What is the FV of $1,000 earning 8% with continuous compounding, after 100 years?
4. If you receive $100 five years from now, what is the PV of that $100 if your opportunity cost is 6%?
5. What is the PV of $1,000 to be received 15 years from now if your opportunity cost is 7%?
6. Suppose you placed $100 in an account that pays 8% interest, compounded monthly. How long will it take for your account to grow to $500?

*Mathematical Solution:*

*PV = FV / (1 + i)n*

*100 = 500 / (1+ .008)N*

*5 = (1.008)N*

*ln 5 = ln (1.008)N*

*ln 5 = N ln (1.008)*

*1.60944 = .007968 N N = 202 months*

1. What should you be willing to pay in order to receive $10,000 annually forever, if you require 8% per year on the investment?
2. If you invest $1,000 at the beginning of each of the next 3 years at 8%, how much would you have at the end of year 3?
3. Which is the better loan: 8% compounded annually, or 7.85% compounded quarterly
4. If you borrow $100,000 at 7% fixed interest for 30 years in order to buy a house, what will be your monthly house payment?