

## Week in Review #7

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### Section F.3 and F.4: Annuities, Sinking Funds, and Amortization

- an annuity is a sequence of payments made at a regular time intervals.

For this class the annuities have these characteristics.

- payments are equal in size.
- payments are made at the end of the period
- payments coincide with the interest conversion period.
- Use the TVM Solver to solve these problems.
  - press the APPS button and select finance and then select TVM Solver.
- the variables that are used in the TVM Solver.

**N**=  $m * t$  which is the total number of periods(compoundings) for the life of the account.

**I%**= The interest rate per year as a percentage.

**PV**= The present value(starting value) of the account.

**PMT**= This is the payment that is made each period.

**FV**= The future value(end value) of the account.

**P/Y** = The number of payments per year.

**C/Y** = The number of compoundings per year.

For this class, P/Y and C/Y are equal and **PMT:END BEGIN** should be set to END.

- the **equity** of an item is the value of the item minus the amount still owed on the item.

1. Doug needs \$7000 in 7 years. He has \$900 that he will start the account with and then will make quaterly payments. The account has an interest rate of 7.5% per year compounded quaterly. What is the amount of the payment that will allow him to reach his goal?

2. David start saving for college when he turned nine years old. He started his account with \$100 from his grandparents and then he would make a deposit of \$20 every month. His account earns interest at a rate of 5.6% per year compounded monthly.

(a) How much will he have in his account when he turns 18?

(b) How much interest did David earn on this account?

3. Sue, who just turned 20, has started a savings account where she will deposit \$50 every month. The account earns interest at a rate of 7% per year compounded monthly.
- (a) How much money will be in the account after 4 years?
- (b) After 4 years, Sue decides to start saving \$100 every month. What is the balance of the account when Sue turned 30?
4. You start an account with \$1,500 and are going to make monthly payments into the account of \$250. The account earns interest at a rate of 7%/year compounded monthly.
- (a) what is the balance of the account after the 20th payment?
- (b) How much interest did the account earn in the 20th period?
- (c) How much interest did the account earn in the third year?

5. Management anticipates a capital expenditure of \$120,000 in seven years for the purpose of painting the exterior of the building. In order to be able to pay for this maintenance, a fund will be set up that will earn interest at the rate of 5.8% per year compounded quarterly.
- (a) Determine the amount of each quarterly payment that will be deposited into the fund.
- (b) How much interest did the fund earn during its lifetime?
6. A couple has a 6-year old child. Assuming the child is going to college in 12 years, the couple estimates that they will need \$10,000 to pay for the first year.
- (a) How much will they have to invest now at 12.5% compounded quarterly in order to meet this goal?
- (b) Suppose they have \$700 to deposit today and want to make quarterly payments for the next 12 years. How much should the payments be in order to meet this goal?
7. Maggie owes \$4500 on a credit card that charges 14.5% per year compounded monthly. How much should she pay monthly if
- (a) she wants the balance to be zero in five years?
- (b) she wants the balance to be \$1100 in three years?

8. Doug loaned his brother, Sam, some money six years ago. Sam has been paying Doug \$60 every month from that time so that he could pay off this debt and has just made his last payment. If Doug charged his brother 0.75% per year compounded monthly,

(a) How much money did Doug loan Sam?

(b) How much interest did Doug make on the loan?

9. Mr. Mitchell has deposited \$125 in his IRA at the end of each month for the past 30 years. His investment has earned interest at the rate of 8% per year compounded monthly over this period. Now, at age 60, he is considering retirement. What monthly payment will he receive over the next 18 years? Assume the interest rate and the compounding style stay the same over the life of the account.

10. Bill and Sue have decided to buy a house. They can make a down payment of \$30,000 and monthly payments up to \$800. The lowest rate that they were quoted was 7.2% per year compounded monthly for 30 years.

(a) What is the the most expensive house they can afford to buy?

(b) Suppose the house that they decide to buy has a price tag of \$139,000. What are the monthly payments that they would pay to amortize(payoff) the loan?

(c) Create an amortization chart for the first three months of the house loan.

period	interest owed	payment	amt. toward principal	outstanding principal
0	—	—	—	
1				
2				
3				

(d) After 12 years of house payments, how much equity will they have in the house? Assume the value of the house remains constant.

11. Jason is buying a some land for a price of \$114,000. He makes a downpayment of 15% and borrows the rest from a bank at an interest rate of 6.45% per year compounded monthly. The loan will have to be paid off in 12 years.

(a) What payments will he need to make to pay off the loan?

(b) After 7 years of making payments, how much equity will he have? Assume the value of the land remains constant.

12. Jacob currently owes \$4,500 to the store for the furniture that he purchased. He made a downpayment of \$3,000 and has been making payments of \$350 each month for the last three years. The store is charging him interest of 6.3% per year compounded monthly on the loan.

(a) What was the purchase price of the furniture?

(b) How many more payments will he have to make until the furniture is paid off?