

**Chapter 5 Homework Problems**

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**Section 5.1**

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1. You invest \$5000 at 6%/year simple interest. How much is in the account at the end of 8 months?
  2. Matt paid \$116.10 interest on a loan at 9%/year simple interest for 1.5 years. How much did he borrow?
  3. You deposit \$600 into an account for 8 months. At the end of this time you have \$638.
    - (a) What is the annual simple interest rate for this account?
    - (b) What is the monthly simple interest rate for this account?
  4. If you buy a 26 week T-bill (treasury bill) with a maturity value of \$10,000 for \$9,562.56 from the U.S. Treasury department. What annual simple interest rate will you earn?
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5. Determine which is the better investment. 8.7%/year compounded semiannually or 8.6%/year compounded monthly. Justify your answer.
  6. What is the effective rate of 12% compounded quarterly?
  7. You put \$1000 into an account that pays 5%/year compounded quarterly.
    - (a) How much do you have in 6 years?
    - (b) What is the effective yield of this account?
  8. You put \$2,000 into an account and 5 years later had \$8,450.50. If the account earned interest compounded monthly, what was the interest rate?
  9. How much interest is earned in six years if \$3400 is deposited into an account that pays interest at a rate of 4%/year compounded semiannually?
  10. Fredd needs \$7000 in 4 years. How much does he deposit now so that he will have this money if the account earns 4.5%/year compounded quarterly?
  11. Alex wishes to have \$3000 available to buy a car in four years. How much should he invest in a savings account now so that he will be able to do this? The bank pays 10%/year interest compounded monthly.
  12. Six years ago, John bought some stock of a pizza company. Unfortunately, this stock has decreased in value by 5% every 4 months. If the current value of the stock is \$375.78, how much did John invest in the company when he bought the stock?

13. You would like to purchase a 20-year zero-coupon U.S. treasury bond with a maturity value of \$10,000 and a nominal rate of 7% per year. How much should you pay for the bond?
14. A small business borrows \$50,000 for expansion and will repay the loan (interest plus principal) 5 years later.
  - (a) If the loan is charged interest at 12% compounded monthly, how much interest will the business pay?
  - (b) A year later, with the expansion complete, the owners of the business decided to start saving to repay the loan. What monthly payments should they make into an account earning interest at 5% compounded monthly so that they can repay the loan (interest and principal) when it is due?

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**Section 5.2 and 5.3**

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15. Bob wants to deposit \$300 at the end of every six months into an IRA that pays 6.25%/year compounded semiannually.
  - (a) How much money is in the account at the end of 20 years?
  - (b) How much money did Bob deposit into the account?
  - (c) How much interest did Bob get on the account?
16. You make a payment of \$50 every month for 3 years. If the interest rate of the account is 5% compounded monthly,
  - (a) What is the balance after 3 years?
  - (b) How much interest did you earn with this account?
17. Sue starts an account with \$500 and will make quarterly payments so that the account will have \$6000 at the end of 5 years. The account has an interest rate of 7% per year compounded quarterly.
  - (a) What quarterly payment should be made?
  - (b) what is the balance of the account after the 15th payment?
  - (c) How much interest did the account earn in the 15th period?
  - (d) How much interest did the account earn in the third year?
18. You deposit \$500 into an account and then make quarterly payments of \$150 for the next 5 years. How much will be in the account at the end of the 5 years if you earn interest at a rate of 6% compounded quarterly?
19. What is the value of the account at the end of 10 years if \$1,000 is deposited every 6 months into an account earning 8%/year compounded semiannually?

20. You are going to make monthly payments into the account of \$100. The account earns interest at a rate of 7%/year compounded monthly. You want the balance at the end of 4 years to be \$7000.
- How much should you start this account with?
  - what is the balance of the account after the 20th payment?
  - How much interest did the account earn in the 20th period?
  - How much interest did the account earn in the third year?
21. A company estimates it will have to replace a piece of equipment at a cost of \$100,000 in 5 years. To have this money available in 5 years, a fund is established by depositing \$30,000 and making fixed monthly payments into an account paying 7%/year compounded monthly. How much should each payment be?
22. Bob won a lawsuit a few years ago and in the settlement, he is to receive monthly payments of \$1500, for 22 years. Bob has decided to sell his payments to another company for a lump sum. What amount would he get if there are still 16 years of payments left and the company is willing to buy the payments at an interest rate of
- 6.4%/year compounded monthly.
  - 3.5%/year compounded monthly.
  - For part (a), How much more money would Bob have received if he didn't sell the payments?
23. You have an annuity that pays you quarterly payments of \$6000. You are in need of some cash and have decided to sell the annuity. The annuity currently has 78 payments remaining, i.e. you still have 78 payments to receive. How much money would you get if somebody is willing to buy this investment at the interest rate of
- 2.5%/year compounded quarterly.
  - 5.7%/year compounded quarterly.
  - For part (a), How much more money would Bob have received if he didn't sell the payments?
24. You decide to save for the future. You place \$1000 into an account and then will make payments of \$75 every month for the next 15 years. Interest rates have been rising slowly over this time period. During the first five years the interest rate was 5% compounded monthly. During the next six years the interest rate was 6.25% compounded monthly. During the last years of the account, the interest rate was 7% compounded monthly.
- How much will you have in the account at the end of the 15 years?
  - How much interest will you have earned over the life of the account?
25. How much should you deposit in an account now, paying 8% per year compounded quarterly, in order to receive quarterly payments of \$1,000 for the next four years?
26. What is the monthly payment for a \$20,000 loan to be repaid in five years if an interest rate of 9% per year compounded monthly is charged on the unpaid balance?
27. A sailboat costs \$16,000. You amortize the loan with equal monthly payments over a 6 year period. If the interest on the unpaid balance is 18% compounded monthly.
- What monthly payment will pay off the loan?
  - How much interest did you pay?
  - Make an amortization table for the first two periods of the loan.
28. You have borrowed \$8,000 from a bank and are making monthly payments to pay back the loan in 5 years. The interest rate is 15%/year compounded monthly and you are making monthly payments of \$300. Make an amortization table for the first two periods of the loan.
29. If you buy a television set for \$800 and agree to pay for it in eighteen equal monthly payments with an interest rate of 1.6% per month, or 19.2%/year compounded monthly,
- How much are your payments?
  - How much interest will you pay?
  - Make an amortization schedule for the first 4 months.
30. You decide to save for the future and start this account when you turn 20. You start the account with \$1000 and make monthly deposits of \$150 into an account paying interest at a rate of 6% per year compounded monthly. At age 65, when you retire, you will receive payments for the next 15 years.
- If you continued this until you retired at age 65, how much money would you have in the account?
  - Now that you have retired, you want to start receiving monthly payments from this account. Assume the interest rate stays the same. What payment would you receive for the next 15 years so that the account will be empty at the end?
31. Mark has started to think about his retirement and has decided that his goal is to receive quarterly payments of \$6,000 for 15 years when he retires at age 65. To achieve this goal, Mark is going to make quarterly payments into his retirement account for forty years. He just turned 25. His retirement account earns interest at a rate of 6% per year compounded quarterly. What payments should he make to meet this goal?

32. Jason has \$210,000 that he is depositing into an account that has an interest rate of 8.5% compounded monthly. Jason will receive monthly payments from this account.
- How many monthly payments of \$2000 will Jason be able to withdraw from this account.
  - What is the largest amount of money that Jason can withdraw monthly that will not diminish the balance of the account.
33. Bob buys a house for \$285,000. He pays \$60,000 down and takes out a mortgage at 9.5% compounded monthly on the balance.
- Find his monthly payment if the length of the mortgage is 20 years.
  - How much would he still owe after 5 years of payments?
  - How much would he still owe after 12 years of payments?
34. You have just bought a new car (or truck) for \$30,000. The loan is for 6 years with an interest rate of 3% compounded monthly. After you make 3 years of payments, how much money will you still owe on your car (truck)?
35. A car dealership is offering a way to keep car payments low. The dealership has a loan where at the end of the loan, you are required to make a lump-sum payoff to payoff the car. The car that you want to buy is worth \$28,000 and you will make monthly payments for 4 years while the loan's interest rate is 5% compounded monthly. What would your payments be if at the end of the loan you still owed \$9,000? (Note: this is how some car leasing programs work.)
36. Your parents set a college expense account for you. They anticipated that your "college expenses" would be \$800 each month and you will be paid this amount at the end of every month for 5 years. The account gets an interest rate of 4.5% per year compounded monthly. What amount do your parents need to deposit into the account when you start college? Assume that the account is empty after 5 years.
37. Stereo Shack sells a stereo system for \$600 down and monthly payments of \$30 for the next three years. If the interest rate is 1.25% per month (or 15% per year compounded monthly) on the unpaid balance, find the cost (purchase price) of the system. In other words, what was the price tag of the system in the store.
38. You have bought a new TV for \$800 down and will pay monthly payments of \$75 for three years. If the interest rate is 8% per year compounded monthly, find the cost (purchase price) of the TV. In other words, what was the price tag of the TV in the store.
39. Bob, who runs Bob's Burger Stop, has a decision to make. He has two loans that he is making payments on. The first loan has payments of \$625 every month. The interest rate on this loan is 6.25% compounded monthly and he has 4 years left until it is paid off. The second loan has quarterly payments of \$1500. The interest rate of this loan is 4.5% compounded quarterly and he has 8.5 years left to pay off this loan. He would like to consolidate the two loans into one loan. Sue who runs the local bank has offered him the chance to consolidate the loans into a single loan with monthly payments and an interest rate of 5.1% compounded monthly. This new loan would be for 6 years.
- At this time, how much does he owe on the first loan?
  - At this time, how much does he owe on the second loan?
  - What monthly payments would he make if what he owed on the first and second loan were combined into a third loan?
  - How much would he save (or lose) if he did this?
40. David is buying a house that will cost \$185,000 and he will have a down payment of 8%. The interest rate for his loan is 6.36%/year compounded monthly.
- What would be David's monthly payment if he is to pay off the loan in 15 years? How much interest did he pay over the life of the loan?
  - What would be David's monthly payment if he is to pay off the loan in 30 years? How much interest did he pay over the life of the loan?
  - Write an amortization schedule for the first 3 months of the 30 year loan.
  - How much equity would David have after 8 years of house payments on the 30 year note? Assume that the value of the house does not change. **Note: equity = value of the house - amount still left to pay.**
41. Susan is buying a house that cost her \$146,000. The loan is for 30 years at 5.75%/year compounded monthly. Susan decided to try to pay the house off sooner by making payments of \$1100 each month. How much equity would she have after
- 5 years?
  - 10 years?
42. Erica has decided buy a condo. After looking at her finances, she has decided that largest that her monthly payment can be is \$1,275. Due to her minimum standards for the condo, she has also decided that her smallest monthly payment would be \$900. Her parents have offered to give her \$20,000 for a down payment. What

price range of condos should she be looking at if her loan is for 25 years at a nominal rate of 5.45% compounded monthly?

43. Phillip bought a house for \$95,000. He made a 10% down payment and then financed the rest at 7% interest compounded monthly for 30 years. He is now looking into refinancing the house loan after paying on the house for 9 years. He can refinance the loan for 15 years at a rate of 5.5% compounded monthly. However, there is a \$2000 fee to refinance the loan and this fee will be added into the amount of money borrowed for the second loan. .
- (a) What would be his new house payments?
  - (b) How much money would he save/lose by refinancing the loan at this time?
44. Your credit card has a balance of \$2000 and the interest rate is 18%/year compounded monthly.
- (a) If you only make the minimum monthly payment of \$35 per month, how many years will it take to pay off the balance?
  - (b) How much interest did you pay? Assume that you are not making any more charges on the card.
  - (c) repeat parts (A) and (B) if your make a monthly payment is now \$50.