

## Homework: Time Value 2 (Review)

1. Consider a 1-year, \$10,000 CD.
  - a. What is its value at maturity, if it pays
    - i. 10% interest, compounded annually?
    - ii. 5% interest, compounded annually?
    - iii. 15% interest, compounded annually?
  - b. First National Bank offers a CD with 10% nominal interest compounded semiannually. What is its maturity value and effective annual rate?
  - c. SoCal Trust offers a 10% CD with daily compounding. What is its maturity value and effective annual rate?
  - d. What nominal rate must First National offer to make its semiannually compounding CD competitive with SoCal's daily compounding CD?
2. Now consider a 5-year CD. Rework Questions 1.a–1.c with a 5-year ending date.
3. It is estimated that in 5 years the total cost for 1 year of college will be \$20,000.
  - a. How much must be invested now in a CD paying 10% compounded annually in order to accumulate \$20,000?
  - b. What annual rate is needed to produce \$20,000 after 5 years, if only \$10,000 is invested?
  - c. What stated rate must First National offer on its semiannually compounded CD to accumulate \$20,000, if \$10,000 is invested?
4. Now consider 5 annual payments of \$2,000, made at the end of each year.
  - a. What is the future value of this stream, if the payments are invested in an account paying 10% compounded annually?
  - b. What is the future value of this stream, if the payments are invested with First National (semiannual compounding)?
  - c. What payment is needed to accumulate \$20,000 under annual compounding at 10%?
  - d. What lump sum, if deposited today, would produce the same ending value as in 4.a?
  - e. Suppose the payments are only \$1,000, but they are made every 6 months, starting in 6 months.
    - i. What is the future value of this stream, if the 10 payments are invested at 10% compounded annually?
    - ii. What is the future value of this stream, if the payments are invested at First National (semiannual compounding)?

5. Now assume that the payments are made at the beginning of each period. Repeat the analysis in Question 4.
6. Your uncle just gave you a bond which promises to pay a semiannual coupon of \$50 forever. If debt of similar risk yields 5%, what is this bond worth?
7. Consider the following schedule of end-of-year payments:

Year	Cash Flow
0	2,000
1	2,000
2	0
3	1,500
4	2,500
5	4,000

- a. What is the *terminal* value of this stream, if the cash flows are invested at 10% compounded annually?
  - b. What cash flow today is needed to accumulate \$20,000? (The cash flows for Years 1–5 are unchanged.)
8. An investment is estimated to generate annual, end-of-year cash flows of \$20,000 during Years 1–5 and \$25,000 during Years 6–10. If the appropriate discount rate is 12% for Years 1–5 and 10% for Years 6–10, what should you be willing to pay right now to receive this income stream?
9. An internet service provider pays up-front rebates on computer purchases, if you subscribe to their service for \$19.95 per month. Determine the implied nominal interest rates on the following offers, ignoring the value of the service itself and cancellation penalties.
  - a. a \$400 rebate, if you sign up for three years
  - b. a \$250 rebate, if you sign up for two years
  - c. a \$100 rebate, if you sign up for one year
10. Consider borrowing \$20,000 and repaying the loan over a four-year period. If you can borrow at 10%, how much interest and principal will be repaid at the end of each year?
11. You plan to retire in 30 years. After that, you want to receive an annuity of \$1,000 per year for 20 years, beginning immediately upon retirement. If you can earn 10% per year, compounded annually, how much must you invest today?