Chapter 4: Time value of money (Numerical problems)

1. You are considering investing $1,000 at an interest rate of 6% compounded annually for 5 years or investing the $1,000 at 7% per year simple interest for 5 years. Which option is better?

2. Suppose you have the alternative of receiving either $10,000 at the end of five years or *P* dollars today. Currently you have no need for money, so you would deposit the *P* dollars in a bank that pays 6% interest. What value of *P* would make you indifferent in your choice between *P* dollars today and the promise of $10,000 at the end of five years?

3. Suppose that you are obtaining a personal loan from your uncle in the amount of $10,000 (now) to be repaid in two years to cover some of your college expenses. If your uncle usually earns 10% interest (annually) on his money, which is invested in various sources, what minimum lump-sum payment two years from now would make your uncle happy?

4. For an interest rate of 8% compounded annually, find:
(a) How much can be loaned now if $6,000 will be repaid at the end of five years?
(b) How much will be required in four years to repay a $15,000 loan now?

5. If $1,000 is invested now, $1,500 two years from now, and $2,000 four years from now at an interest rate of 6% compounded annually, what will be the total amount in 10 years?

6. What is the future worth of a series of equal year-end deposits of $2,000 for 10 years in a savings account that earns 9%, annual interest if
(a) All deposits are made at the end of each year?
(b) All deposits are made at the beginning of each year?

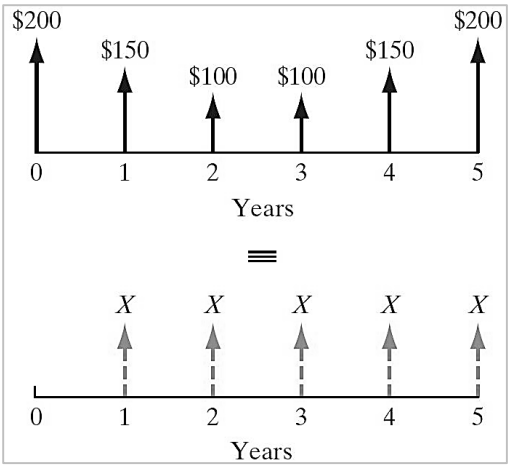
7. A no-load (commission-free) mutual fund has grown at a rate of 13% compounded annually since its beginning. If it is anticipated that it will continue to grow at that rate, how much must be invested every year so that $10,000 will be accumulated at the end of five years?

8. An individual deposits an annual bonus into a savings account that pays 6% interest compounded annually. The size of the bonus increases by $1,000 each year, and the initial bonus amount was $3,000. Determine how much will be in the account immediately after the fifth deposit.

9. What is the amount of 10 equal annual deposits that can provide five annual withdrawals when a first withdrawal of $3,000 is made at the end of year 11 and subsequent withdrawals increase at the rate of 6% per year over the previous year's withdrawal if
(a) The interest rate is 8% compounded annually?
(b) The interest rate is 6% compounded annually?

10. What single amount at the end of the fifth year is equivalent to a uniform annual series of $3,000 per year for 10 years if the interest rate is 6% compounded annually?

11. The two cash flow transactions shown in the accompanying cash flow diagram are said to be equivalent at 10% interest compounded annually. Find the unknown value of *X* that satisfies the equivalence.



12. You have $10,000 available for investment in stock. You are looking for a growth stock whose value can grow to $35,000 over five years. What kind of growth rate are you looking for?

13. The State of Florida sold a total of 36.1 million lottery tickets at $1 each during the first week of January 2000. As prize money, a total of $41 million will be distributed ($1,952,381 at the *beginning* of each year) over the next 21 years. The distribution of the first-year prize money occurs now, and the remaining lottery proceeds will be put into the state's educational reserve fund, which earns interest at the rate of 6% compounded annually. After making the last prize distribution (at the beginning of year 21), how much will be left over in the reserve account?

14. War Eagle Financial Sources, which makes small loans to college students, offers to lend $400. The borrower is required to pay $26.61 at the end of each week for 16 weeks. Find the interest rate per week. What is the nominal interest rate per year? What is the effective interest rate per year?

15. A financial institution is willing to lend you $40. However, $45 is repaid at the end of one week.
(a) What is the nominal interest rate?
(b) What is the effective annual interest rate?

16. How many years will it take an investment to triple if the interest rate is 8% compounded
(a) Quarterly? (b) Monthly? (c) Continuously?

17. A series of equal quarterly payments of $5,000 for 12 years is equivalent to what present amount at an interest rate of 9% compounded as follows:
(a) Quarterly? (b) Monthly? (c) Continuously?

18. What is the future worth of an equal payment series of $5,000 each quarter for five years if the interest rate is 8% compounded continuously?

19. If the interest rate is 7.5% compounded continuously, what is the required quarterly payment to repay a loan of $10,000 in 4 years?