4-5 How much must be deposited now at $5\frac{1}{4}%$ interest to produce $300 at the end of every year for 10 years?

4-6 A man buys a car for $3000 with no money down. He pays for the car in 30 equal monthly payments with interest at 12% per annum, compounded monthly. What is his monthly loan payment? 

(Answer: $116.10$)

4-7 A car may be purchased with a $3000 down payment now and 60 monthly payments of $280. If the interest rate is 12% compounded monthly, what is the price of the car?

4-8 A company deposits $2000 in a bank at the end of every year for 10 years. The company makes no deposits during the subsequent 5 years. If the bank pays 8% interest, how much would be in the account at end of 15 years?

4-9 A city engineer knows that she will need $25 million in 3 years to replace toll booths on a toll road in the city. Traffic on the road is estimated to be 20 million vehicles per year. How much per vehicle should the toll be to cover the cost of the toll booth replacement project? Interest is 10%. (Simplify your analysis by assuming that the toll receipts are received at the end of each year in a lump sum.)

4-10 A student wants to have $30,000 at graduation 4 years from now to buy a new car. His grandfather gave him $10,000 as a high school graduation present. How much must the student save each year if he deposits the $10,000 today and can earn 12% on both the $10,000 and his earnings in a mutual fund his grandfather recommends?

4-11 Using linear interpolation, determine the value of $(P/A, 6\frac{1}{2}%, 10)$ from the compound interest tables. Compute this same value using the equation. Why do the values differ?

4-12 How many months will it take to pay off a $525 debt, with monthly payments of $15 at the end of each month, if the interest rate is 18%, compounded monthly? (Answer: 50 months)

4-13 A young engineer wishes to become a millionaire by the time he is 60 years old. He believes that by careful investment he can obtain a 15% rate of return. He plans to add a uniform sum of money to his investment program each year, beginning on his 20th birthday and continuing through his 59th birthday. How much money must the engineer set aside in this project each year?

4-14 A contractor wishes to set up a special fund by making uniform semiannual end-of-period deposits for 20 years. The fund is to provide $10,000 at the end of each of the last 5 years of the 20-year period. If interest is 8%, compounded semiannually, what is the required semiannual deposit?

4-15 What amount will be required to purchase, on an engineer’s 40th birthday, an annuity to provide him with 30 equal semiannual payments of $1000 each, the first to be received on his 50th birthday, if nominal interest is 4% compounded semiannually?

4-16 The first of a series of equal semiannual cash flows occurs on July 1, 2007, and the last occurs on January 1, 2020. Each cash flow is equal to $128,000. The nominal interest rate is 12% compounded semiannually. What single amount on July 1, 2011 is equivalent to this cash flow system?

4-17 On January 1, Frank Jenson bought a used car for $4200 and agreed to pay for it as follows: 1/3 down payment; the balance to be paid in 36 equal monthly payments; the first payment due February 1; an annual interest rate of 9%, compounded monthly.

(a) What is the amount of Frank’s monthly payment?

(b) During the summer, Frank made enough money to pay off the entire balance due on the car as of October 1. How much did Frank owe on October 1?

4-18 Mary Lavor plans to save money at her bank for use in December. She will deposit $30 a month, beginning on March 1 and continuing through November 1. She will withdraw all the money on December 1. If the bank pays $1/2% interest each month, how much money will she receive on December 1?

4-19 If $i = 12\%$, for what value of $B$ is the present value $= 0$.

4-20 Compute $E$ so that the cash flows have a present value of 0.
4-21 A man borrowed $500 from a bank on October 15th. He must repay the loan in 16 equal monthly payments, due on the 15th of each month, beginning November 15th. If interest is computed at 1% per month, how much must he pay each month?  (Answer: $33.95)

4-22 Jerry bought a house for $500,000 and made a $100,000 down payment. He obtained a 30-year loan for the remaining amount. Payments were made monthly. The nominal annual interest rate was 9%. After 10 years (120 payments) he decided to pay the remaining balance on the loan.

(a) What was his monthly loan payment?
(b) What must he have paid (in addition to his regular 120th monthly payment) to pay the remaining balance of his loan?

4-23 A man wants to help provide a college education for his young daughter. He can afford to invest $600/yr for the next 4 years, beginning on the girl’s 4th birthday. He wishes to give his daughter $4000 on her 18th, 19th, 20th, and 21st birthdays, for a total of $16,000. Assuming 5% interest, what uniform annual investment will he have to make on the girl’s 8th through 17th birthdays?  (Answer: $792.73)

4-24 Table 3-1 presented four plans for the repayment of $5000 in 5 years with interest at 8%. Still another way to repay the $5000 would be to make four annual end-of-year payments of $1000 each, followed by a final payment at the end of the fifth year. How much would the final payment be?

4-25 A $150 bicycle was purchased on December 1 with a $15 down payment. The balance is to be paid at the rate of $10 at the end of each month, with the first payment due on December 31. The last payment may be some amount less than $10. If interest on the unpaid balance is computed at 11/2% per month, how many payments will there be, and what is the amount of the final payment?  (Answers: 16 payments; final payment: $1.99)

4-26 A company buys a machine for $12,000, which it agrees to pay for in five equal annual payments, beginning one year after the date of purchase, at an annual interest rate of 4%. Immediately after the second payment, the terms of the agreement are changed to allow the balance due to be paid off in a single payment the next year. What is the final single payment?  (Answer: $7778)

4-27 An engineering student bought a car at a local used car lot. Including tax and insurance, the total price was $3000. He is to pay for the car in 12 equal monthly payments, beginning with the first payment immediately (in other words, the first payment was the down payment). Nominal interest on the loan is 12%, compounded monthly. After six payments (the down payment plus five additional payments), he decides to sell the car. A buyer agrees to pay a cash amount to pay off the loan in full at the time the next payment is due and also to pay the engineering student $1000. If there are no penalty charges for this early payment of the loan, how much will the car cost the new buyer?

4-28 A realtor sold a house on August 31, 2007, for $150,000 to a buyer in which a 20% down payment was made. The buyer took a 15-year mortgage on the property with an effective interest rate of 8% per annum. The buyer intends to pay off the mortgage owed in yearly payments starting on August 31, 2008.

(a) How much of the mortgage will still be owed after the payment due on August 31, 2014, has been made?
(b) Solve the same problem by separating the interest and the principal amounts.

4-29 To provide for a college education for his daughter, a man opened an escrow account in which equal deposits were made. The first deposit was made on January 1, 1991, and the last deposit was made on January 1, 2008. The yearly college expenses including tuition were estimated to be $8000, for each of the 4 years. Assuming the interest rate to be 5.75%, how much did the father have to deposit each year in the escrow account for the daughter to draw $8000 per year for 4 years beginning January 1, 2008?

4-30 A bank recently announced an “instant cash” plan for holders of its bank credit cards. A cardholder may receive cash from the bank up to a preset limit (about $500). There is a special charge of 4% made at the time the “instant cash” is sent to the cardholders. The debt may be repaid in monthly installments. Each month the bank charges 11/2% on the unpaid balance. The monthly payment, including interest, may be as little as $10. Thus, for $150 of “instant cash,” an initial charge of $6 is made and added to the balance due. Assume the cardholder makes a monthly payment
of $10 (this includes both principal and interest). How many months are required to repay the debt? If your answer includes a fraction of a month, round up to the next month.

4-31 An engineer borrowed $3000 from the bank, payable in six equal end-of-year payments at 8%. The bank agreed to reduce the interest on the loan if interest rates declined in the United States before the loan was fully repaid. At the end of 3 years, at the time of the third payment, the bank agreed to reduce the interest rate on the remaining debt from 8% to 7%. What was the amount of the equal annual end-of-year payments for each of the first 3 years? What was the amount of the equal annual end-of-year payments for each of the last 3 years?

4-32 A bank is offering a loan of $25,000 with a nominal interest rate of 18% compounded monthly, payable in 60 months. (Hint: The loan origination fee of 2% will be taken out from the loan amount.)
(a) What is the monthly payment?
(b) If a loan origination fee of 2% is charged at the time of the loan, what is the effective interest rate?

4-33 A local finance company will loan $10,000 to a homeowner. It is to be repaid in 24 monthly payments of $499 each. The first payment is due 30 days after the $10,000 is received. What interest rate per month are they charging? (Answer: 1½%)

4-34 A woman made 10 annual end-of-year purchases of $1000 worth of common stock. The stock paid no dividends. Then for 4 years she held the stock. At the end of the 4 years she sold all the stock for $28,000. What interest rate did she obtain on her investment?

4-35 One of the largest car dealers in the city advertises a 3-year-old car for sale as follows:

Cash price $3575, or a down payment of $375 with 45 monthly payments of $93.41. Susan DeVaux bought the car and made a down payment of $800. The dealer charged her the same interest rate used in his advertised offer. How much will Susan pay each month for 45 months? What effective interest rate is being charged? (Answers: $81.03; 16.1%)

Relationships Between Factors

4-36 For some interest rate $i$ and some number of interest periods $n$, the uniform series capital recovery factor is 0.1408 and the sinking fund factor is 0.0408. What is the interest rate? What is $n$?

4-37 For some interest rate $i$ and some number of interest periods $n$, the uniform series capital recovery factor is 0.1728 and the sinking fund factor is 0.0378. What is the interest rate?

4-38 Derive an equation to find the end-of-year future sum $F$ that is equivalent to a series of $n$ beginning-of-year payments $B$ at interest rate $i$. Then use the equation to determine the future sum $F$ equivalent to six $B$ payments of $100 at 8% interest.
(Answer: $F = 792.28$)

4-39 If $200 is deposited in a savings account at the beginning of each of 15 years, and the account draws interest at 7% per year, how much will be in the account at the end of 15 years?

Arithmetic Gradients

4-40 Assume a 10% interest rate and find $S$, $T$, and $x$.

\[ S = \text{value at } t = 0 \]
\[ T = \text{uniform value for } t = 4 \]
\[ x = \text{uniform value for } t = 4 \]

\( (a) S = \text{value at } t = 0 \)
\( (b) T = \text{uniform value for } t = 4 \)
\( (c) x = \text{uniform value for } t = 4 \)

\( (\text{Answers: } S = 218.90; T = 54.30; x = 66.24) \)

4-41 Compute the unknown values.

\[ i = 10\% \]
\[ i = 10\% \]

\( (a) C = \text{value at } t = 0 \)
\( (b) F = \text{value at } t = 4 \)
4-42 For diagrams (a) to (d), compute the present values of the cash flows.

(a) \( i = 10\% \)

(b) \( i = 10\% \)

(c) \( i = 10\% \)

(d) \( i = 10\% \)

4-43 Compute the present value of the cash flows.

\( i = 10\% \)

(Answer: $589.50)

4-44 Use a 15% interest rate to compute the present value of the cash flows.

\( i = 10\% \)

4-45 The cash flows have a present value of 0. Compute the value of \( C \), assuming a 10% interest rate.

4-46 If \( i = 12\% \), for what value of \( G \) does the present value equal 0?

4-47 The cash flows have a present value equal 0. Compute the value of \( D \) in the diagram.

4-48 Using a 10% interest rate, for what value of \( B \) does the present value equal 0?
4-49 These cash flow transactions are said to be equivalent in terms of economic desirability at an interest rate of 12% compounded annually. Determine the unknown value $A$.

A. $100 = 50 + 10(A/G, i, 5) + 50(P/F, i, 5)$
B. $1 = \frac{50(P/A, i, 5) + 10(P/G, i, 5) + 50(P/F, i, 5)}{100}$
C. $100(A/P, i, 5) = 50 + 10(A/G, i, 5)$
D. None of the equations are correct.

4-50 For what value of $P$ in the cash flow diagram does the present value equal 0?

4-51 Use a 10% interest rate to compute the present value of the cash flows.

4-52 Consider the cash flow:

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$-100</td>
</tr>
<tr>
<td>1</td>
<td>+50</td>
</tr>
<tr>
<td>2</td>
<td>+60</td>
</tr>
<tr>
<td>3</td>
<td>+70</td>
</tr>
<tr>
<td>4</td>
<td>+80</td>
</tr>
<tr>
<td>5</td>
<td>+140</td>
</tr>
</tbody>
</table>

Which one of the following is correct for this cash flow?

4-53 Consider the following cash flow:

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$-5000</td>
</tr>
<tr>
<td>1</td>
<td>+1000</td>
</tr>
<tr>
<td>2</td>
<td>+850</td>
</tr>
<tr>
<td>3</td>
<td>+700</td>
</tr>
<tr>
<td>4</td>
<td>+550</td>
</tr>
<tr>
<td>5</td>
<td>+400</td>
</tr>
<tr>
<td>6</td>
<td>+400</td>
</tr>
<tr>
<td>7</td>
<td>+400</td>
</tr>
<tr>
<td>8</td>
<td>+400</td>
</tr>
</tbody>
</table>

Alice was asked to compute the value of $P$ for the cash flow at 8% interest. She wrote three equations:

A. $P = 1000(P/A, 8\%, 8) - 150(P/G, 8\%, 8) + 150(P/G, 8\%, 4)(P/F, 8\%, 4)$
B. $P = 400(P/A, 8\%, 8) + 600(P/A, 8\%, 5) - 150(P/G, 8\%, 4)$
C. $P = 150(P/G, 8\%, 4) + 850(P/A, 8\%, 4) + 400(P/A, 8\%, 4)(P/F, 8\%, 4)$

Which of the equations is correct?

4-54 It is estimated that the maintenance cost on a new car will be $40 the first year. Each subsequent year, this cost is expected to increase by $10. How much would you need to set aside when you bought a new car to pay all future maintenance costs if you planned to keep the vehicle for 7 years? Assume interest is 5% per annum. (Answer: $393.76)

4-55 The council members of a small town have decided that the earth levee that protects the town flooding should be rebuilt and strengthened. The town engineer estimates that the cost of the work at the end of the first year will be $85,000. He estimates that in subsequent years the annual repair costs will decline by $10,000, making the second-year cost $75,000; the third-year $65,000, and so forth. The council members want to know what the equivalent present cost is for the first 5 years of repair work if interest is 4%. (Answer: $292,870)
4-56 A firm expects to install smog control equipment on the exhaust of a gasoline engine. The local smog control district has agreed to pay to the firm a lump sum of money to provide for the first cost of the equipment and maintenance during its 10-year useful life. At the end of 10 years the equipment, which initially cost $10,000, is valueless. The firm and the smog control district have agreed that the following are reasonable estimates of the end-of-year maintenance costs:

<table>
<thead>
<tr>
<th>Year</th>
<th>$500</th>
<th>Year</th>
<th>$200</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>3</td>
<td>125</td>
</tr>
<tr>
<td>4</td>
<td>150</td>
<td>5</td>
<td>175</td>
</tr>
</tbody>
</table>

Assuming interest at 6% per year, how much should the smog control district pay to the firm now to provide for the first cost of the equipment and its maintenance for 10 years? (Answer: $11,693)

4-57 A debt of $5000 can be repaid, with interest at 8%, by the following payments.

<table>
<thead>
<tr>
<th>Year</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$500</td>
</tr>
<tr>
<td>2</td>
<td>1000</td>
</tr>
<tr>
<td>3</td>
<td>1500</td>
</tr>
<tr>
<td>4</td>
<td>2000</td>
</tr>
<tr>
<td>5</td>
<td>X</td>
</tr>
</tbody>
</table>

The payment at the end of the fifth year is shown as X. How much is X?

4-58 A man is buying a small garden tractor. There will be no maintenance cost during the first 2 years because the tractor is sold with 2 years free maintenance. For the third year, the maintenance is estimated at $20. In subsequent years the maintenance cost will increase by $20 per year (i.e., fourth-year maintenance will be $40, fifth-year $60, etc.). How much would need to be set aside now at 8% interest to pay the maintenance costs on the tractor for the first 6 years of ownership?

4-59 A man decides to deposit $50 in the bank today and to make 10 additional deposits every 6 months beginning 6 months from now, the first of which will be $50 and increasing $10 per deposit after that. A few minutes after making the last deposit, he decides to withdraw all the money deposited. If the bank pays 6% nominal interest compounded semiannually, how much money will he receive?

4-60 A man makes an investment every 3 months at a nominal annual interest rate of 28%, compounded quarterly. His first investment was $100, followed by investments increasing $20 each 3 months. Thus, the second investment was $120, the third investment $140, and so on. If he continues to make this series of investments for a total of 20 years, what will be the value of the investments at the end of that time?

4-61 The following cash flows are equivalent in value if the interest rate is $i$. Which one is more valuable if the interest rate is $2i$?

![Diagram A](image1)

![Diagram B](image2)

4-62 The following cash flows are equivalent in value if the interest rate is $i$. Which one is more valuable if the interest rate is $2i$?

![Diagram C](image3)

![Diagram D](image4)

**Geometric Gradients**

4-63 A set of cash flows begins at $20,000 the first year, with an increase each year until $n = 10$ years. If the interest rate is 8%, what is the present value when

(a) the annual increase is $2000$?

(b) the annual increase is 10%?

(Answer: (b) $201,405$)

4-64 A set of cash flows begins at $50,000 the first year, with an increase each year until $n = 15$ years. If the interest rate is 7%, what is the present value when

(a) the annual increase is $5000$?

(b) the annual increase is 10%?

4-65 A set of cash flows begins at $20,000 the first year, with an increase each year until $n = 10$ years. If the interest rate is 10%, what is the present value when

(a) the annual increase is $2000$?

(b) the annual increase is 10%?
4-66 A set of cash flows begins at $20,000 the first year, with a decrease each year until \( n = 10 \) years. If the interest rate is 8%, what is the present value when

(a) the annual decrease is $2000?

(b) the annual decrease is 10%?

4-67 The market for a product is expected to increase at an annual rate of 8%. First-year sales are estimated at $60,000, the horizon is 15 years, and the interest rate is 10%. What is the present value?

4-68 Fred is evaluating whether a more efficient motor with a life of 5 years should be installed on an assembly line. Energy savings are estimated at $400 for the first year, then increasing by 6% annually. If the interest rate is 10%, what is the present value of the energy savings?

4-69 In Problem 4-68, what if the energy savings are increasing by 15% annually?

4-70 Suzanne is a recent chemical engineering graduate who has been offered a 5-year contract at a remote location. She has been offered two choices. The first is a fixed salary of $75,000 per year. The second has a starting salary of $65,000 with annual raises of 5% starting in Year 2. (For simplicity, assume that her salary is paid at the end of the year, just before her annual vacation.) If her interest rate is 9%, which should she take?

4-71 Mark Johnson saves a fixed percentage of his salary at the end of each year. This year he saved $1500. For the next 5 years, he expects his salary to increase at an 8% annual rate, and he plans to increase his savings at the same 8% annual rate. He invests his money in the stock market. Thus there will be six end-of-year investments (the initial $1500 plus five more). Solve the problem using the geometric gradient factor.

(a) How much will the investments be worth at the end of 6 years if they increase in the stock market at a 10% annual rate?

(b) How much will Mark have at the end of 6 years if his stock market investments increase only at 8% annually?

4-72 The Macintosh Company has an employee savings plan that allows every employee to invest up to 5% of his or her annual salary. The money is invested in company common stock with the company guaranteeing that the annual return will never be less than 8%. Jill was hired at an annual salary of $52,000. She immediately joined the savings plan investing the full 5% of her salary each year. If Jill’s salary increases at an 8% uniform rate, and she continues to invest 5% of it each year, what amount of money is she guaranteed to have at the end of 20 years?

4-73 The football coach at a midwestern university was given a 5-year employment contract that paid $225,000 the first year, and increased at an 8% uniform rate in each subsequent year. At the end of the first year’s football season, the alumni demanded that the coach be fired. The alumni agreed to buy his remaining years on the contract by paying him the equivalent present sum, computed using a 12% interest rate. How much will the coach receive?

4-74 A 25-year-old engineer is opening an individual retirement account (IRA) at a bank. Her goal is to accumulate $1 million in the account by the time she retires from work in 40 years. The bank manager estimates she may expect to receive 8% nominal annual interest, compounded quarterly, throughout the 40 years. The engineer believes her income will increase at a 7% annual rate during her career. She wishes to start her IRA with as low a deposit as possible and increase it at a 7% rate each year. Assuming end-of-year deposits, how much should she deposit the first year?

**Nominal and Effective Interest Rates**

4-75 A thousand dollars is invested for 7 months at an interest rate of 1% per month. What is the nominal interest rate? What is the effective interest rate? (Answers: 12%; 12.68%)

4-76 A firm charges its credit customers 13\% interest per month. What is the effective interest rate?

4-77 If the nominal annual interest rate is 12% compounded quarterly, what is the effective annual interest rate?

4-78 A local store charges 11\% each month on the unpaid balance for its charge account. What nominal annual interest rate is being charged? What is the effective interest rate?

4-79 What interest rate, compounded quarterly, is equivalent to a 9.31% effective interest rate?

4-80 A bank advertises it pays 7% annual interest, compounded daily, on savings accounts, provided the money is left in the account for 4 years. What is the effective annual interest rate?

4-81 At the Central Furniture Company, customers who buy on credit pay an effective annual interest rate of 16.1%, based on monthly compounding. What is the nominal annual interest rate that they pay?
4-95 The Rule of 78's is a commonly used method of computing the amount of interest when the balance of a loan is repaid in advance.

Adding the numbers representing
12 months gives

\[1 + 2 + 3 + 4 + 5 + \cdots + 11 + 12 = 78\]

If a 12-month loan is repaid at the end of one month, for example, the interest the borrower would be charged is 12/78 of the year's interest. If the loan is repaid at the end of 2 months, the total interest charged would be \((12 + 11)/78\), or 23/78 of the year's interest. After 11 months the interest charge would therefore be 77/78 of the total year's interest.

Helen borrowed $10,000 on January 1 at 9% annual interest, compounded monthly. The loan was to be repaid in 12 equal end-of-period payments. Helen made the first two payments and then decided to repay the balance of the loan with the third payment. Thus she will pay the third payment plus an additional sum.

You are to calculate the amount of this additional sum

(a) Based on the rule of 78s.
(b) Based on exact economic analysis methods.

Continuous Compounding

4-96 Select the best of the following five alternatives. Assume the investment is for a period of 4 years and \(P = \$10,000\).

A. 11.98% interest rate compounded continuously
B. 12.00% interest rate compounded daily
C. 12.01% interest rate compounded monthly
D. 12.02% interest rate compounded quarterly
E. 12.03% interest rate compounded yearly

4-97 Traffic at a certain intersection is 2000 cars per day. A consultant has told the city that traffic is expected to grow at a continuous rate of 5% per year for the next 4 years. How much traffic will be expected at the end of 2 years?

4-98 A bank pays 10% nominal annual interest on special three-year certificates. What is the effective annual interest rate if interest is compounded:

(a) Every three months?
(b) Daily?
(c) Continuously?

4-99 A department store charges \(1\frac{3}{4}\)% interest per month, compounded continuously, on its customer's charge accounts. What is the nominal annual interest rate? What is the effective interest rate? (Answers: 21%; 23.4%)

4-100 If you want a 12% rate of return, compounded on a project that will yield $6000 at the end of 2\(\frac{1}{2}\) years, how much must you be willing to invest now? (Answer: $4444.80)

4-101 Bank North advertises, "We pay 6.50%, compounded daily." Bank South says, "We pay 6.50%, compounded continuously." If you deposit $10,000 with Bank South for one year, how much additional interest will you receive?

4-102 Bart wishes to tour the country with his friends. To do this, he is saving money for a bus.

(a) How much money must Bart deposit in a savings account paying 8% nominal annual interest, compounded continuously, in order to have $8000 in 4\(\frac{1}{2}\) years?
(b) A friend offers to repay Bart $8000 in 4\(\frac{1}{2}\) years if Bart gives him $5000 now. Assuming continuous compounding, what is the nominal annual interest rate of this offer?

4-103 The I've Been Moved Corporation receives a constant flow of funds from its worldwide operations. This money (in the form of checks) is continuously deposited in many banks with the goal of earning as much interest as possible for "IBM." One billion dollars is deposited each month, and the money earns an average of \(1\frac{1}{2}\)% interest per month, compounded continuously. Assume all the money remains in the accounts until the end of the month.

(a) How much interest does IBM earn each month?
(b) How much interest would IBM earn each month if it held the checks and made deposits to its bank accounts just four times a month?

4-104 A forklift truck costs $29,000. A company agrees to purchase such a truck with the understanding that it will make a single payment for the balance due in 3 years. The vendor agrees to the deal and offers two different interest schedules. The first schedule uses an annual effective interest rate of 13%. The second schedule uses 12.75% compounded continuously.

(a) Which schedule should the company accept?
(b) What would be the size of the single payment?
PARC Company has money to invest in an employee benefit plan, and you have been chosen as the plan's trustee. As an employee yourself, you want to maximize the interest earned on this investment and have found an account that pays 14% compounded continuously. PARC is providing you $1200 per month to put into your account for 7 years. What will be the balance in this account at the end of the 7-year period?

Barry, a recent engineering graduate, never took engineering economics. When he graduated, he was hired by a prominent architectural firm. The earnings from this job allowed him to deposit $750 each quarter into a savings account. There were two banks that offered savings accounts in his town (a small town!). The first bank was offering 4.5% interest compounded continuously. The second bank offered 4.6% compounded monthly. Barry decided to deposit in the first bank because it offered continuous compounding. Did he make the right decision?

How long will it take for $10,000, invested at 5% per year, compounded continuously, to triple in value?

A friend was left $50,000 by his uncle. He has decided to put it into a savings account for the next year or so. He finds there are varying interest rates at savings institutions: 4 3/8% compounded annually, 4 1/4% compounded quarterly, and 4 1/6% compounded continuously. He wishes to select the savings institution that will give him the highest return on his money. What interest rate should he select?

Jack deposited $500,000 into a bank for 6 months. At the end of that time, he withdrew the money and received $520,000. If the bank paid interest based on continuous compounding:

(a) What was the effective annual interest rate?

(b) What was the nominal annual interest rate?

What single amount on October 1, 2007, is equal to a series of $1000 quarterly deposits made into an account? The first deposit occurs on October 1, 2007, and the last deposit occurs on January 1, 2021. The account earns 13% compounded continuously.

Compounding and Payment Periods Differ

Upon the birth of his first child, Dick Jones decided to establish a savings account to partly pay for his son's education. He plans to deposit $20 per month in the account, beginning when the boy is 13 months old. The savings and loan association has a current interest policy of 6% per annum, compounded monthly, paid quarterly. Assuming no change in the interest rate, how much will be in the savings account when Dick's son becomes 16 years old?

What is the present worth of a series of equal quarterly payments of $3000 that extends over a period of 8 years if the interest rate is 10% compounded monthly?

What single amount on April 1, 2008, is equivalent to a series of equal, semiannual cash flows of $1000 that starts with a cash flow on January 1, 2006, and ends with a cash flow on January 1, 2015? The interest rate is 14% and compounding is quarterly.

Paco's saving account earns 13% compounded weekly and receives quarterly deposits of $38,000. His first deposit occurred on October 1, 2006, and the last deposit is scheduled for April 1, 2022. Tisha's account earns 13% compounded weekly. Semiannual deposits of $18,000 are made into her account, with the first one occurring on July 1, 2016, and the last one occurring on January 1, 2025. What single amount on January 1, 2017, is equivalent to the sum of both cash flow series?

The first of a series of equal monthly cash flows of $2000 occurred on April 1, 2008, and the last of the monthly cash flows occurred on February 1, 2010. This series of monthly cash flows is equivalent to a series of semiannual cash flows. The first semiannual cash flow occurred on July 1, 2011, and the last semiannual cash flow will occur on January 1, 2020. What is the amount of each semiannual cash flow? Use a nominal interest rate of 12% with monthly compounding on all accounts.

A series of monthly cash flows is deposited into an account that earns 12% nominal interest compounded monthly. Each monthly deposit is equal to $2100. The first monthly deposit occurred on June 1, 2008 and the last monthly deposit will be on January 1, 2015. The account (the series of monthly deposits, 12% nominal interest, and monthly compounding) also has equivalent quarterly withdrawals from it. The first quarterly withdrawal is equal to $5000 and occurred on October 1, 2008. The last $5000 withdrawal will occur on January 1, 2015. How much remains in the account after the last withdrawal?

Spreadsheets for Economic Analysis

Develop a complete amortization table for a loan of $4500, to be paid back in 24 uniform monthly installments, based on an interest rate of 6%.