Chapter 3 Self Study Questions

True/False
Indicate whether the sentence or statement is true or false.

____ 1. Cash flow time lines are used primarily for decisions involving paying off debt or investing in financial securities. They cannot be used when making decisions about investments in physical assets.

____ 2. One of the potential benefits of investing early for retirement is that an investor can receive greater benefits from the compounding of interest.

____ 3. Of all the techniques used in finance, the least important is the concept of the time value of money.

____ 4. The coupon rate is the rate of return you could earn on alternative investments of similar risk.

____ 5. A perpetuity is an annuity with perpetual payments.

____ 6. An amortized loan is a loan that requires equal payments over its life; its payments include both interest and repayment of the debt.

____ 7. The greater the number of compounding periods within a year, the greater the future value of a lump sum invested initially, and the greater the present value of a given lump sum to be received at maturity.

____ 8. Suppose an investor can earn a steady 5% annually with investment A, while investment B will yield a constant 12% annually. Within 11 years time, the compounded value of investment B will be more than twice the compounded value of investment A (ignore risk).

____ 9. Solving for the interest rate associated with a stream of uneven cash flows, without the use of a calculator, usually involves a trial and error process.

____ 10. When a loan is amortized, the largest portion of the periodic payment goes to reduce principal in the early years of the loan such that the accumulated interest can be spread out over the life of the loan.

____ 11. The effective annual rate is always greater than the simple rate as a result of compounding effects.

____ 12. Because we usually assume positive interest rates in time value analyses, the present value of a three-year annuity will always be less than the future value of a single lump sum, if the annuity payment equals the original lump sum investment.

____ 13. An annuity is a series of equal payments made at fixed equal-length intervals for a specified number of periods.

____ 14. The difference between an ordinary annuity and an annuity due is that each of the payments of the annuity due earns interest for one additional year (period).

____ 15. The difference between the PV of an annuity due and the PV of an ordinary annuity is that each of the payments of the annuity due is discounted by one more year.

____ 16. The effective annual rate is less than the simple rate when we have monthly compounding.

____ 17. In six years time, you are scheduled to receive money from a trust established for you by your grandparents. When the trust matures there will be $100,000 in the account. If the account earns 9 percent compounded continuously, how much is in the account today?

____ 18. Problem deleted

____ 19. You place $1,000 in an account that pays 7 percent interest compounded continuously. You plan to hold the account exactly three years. Simultaneously, in another account you deposit money that earns 8 percent compounded semiannually. If the accounts are to have the same amount at the end of the three years, how much of an initial deposit do you need to make now in the account that pays 8 percent interest compounded semiannually?

____ 20. Assume one bank offers you a simple annual interest rate of 6 percent compounded daily while another bank offers you continuous compounding at a 5.9 percent simple annual rate. You decide to deposit $1,000 with each bank. Exactly two years later you withdraw your funds from both banks. What is the difference in your withdrawal amounts between the two banks?

____ 21. You have the choice of placing your savings in an account paying 12.5 percent compounded annually, or an account paying 12.0 percent compounded semiannually or an account paying 11.5 percent compounded continuously. To maximize your return you would choose:

____ 22. If you have $5,438 in an account that has been paying an annual rate of 10 percent, compounded continuously, since you deposited some funds 10 years ago, how much was the original deposit?

____ 23. For a 10-year deposit, what annual rate payable semiannually will produce the same effective rate as 4 percent compounded continuously?

____ 24. How much should you be willing to pay for an account today that will have a value of $1,000 in 10 years under continuous compounding if the simple rate is 10 percent?

____ 25. If you receive $15,000 today and can invest it at a 5 percent annual rate compounded continuously, what will be your ending value after 20 years?

____ 26. Given some amount to be received several years in the future, if the interest rate increases, the present value of the future amount will

____ 27. You have determined the profitability of a planned project by finding the present value of all the cash flows from that project. Which of the following would cause the project to look more appealing in terms of the present value of those cash flows?

a. The discount rate decreases.
b. The cash flows are extended over a longer period of time, but the total amount of the cash flows remains the same.
c. The discount rate increases.
d. Answers b and c above.
e. Answers a and b above.

____ 28. Problem deleted

____ 29. Why is the present value of an amount to be received (paid) in the future less than the future amount?

____ 30. By definition, what type of annuity best describes payments such as rent and magazine subscriptions (assuming the costs do not change over time)?

____ 31. Everything else equal, which of the following conditions will result in the *lowest* present value of an amount to be received in the future?
   a. annual compounding
   b. quarterly compounding
   c. monthly compounding
   d. daily compounding

____ 32. Problem deleted

____ 33. Problem deleted

____ 34. A $10,000 loan is to be amortized over 5 years, with annual end-of-year payments. Given the following facts, which of these statements is correct?
   a. The annual payments would be larger if the interest rate were lower.
   b. If the loan were amortized over 10 years rather than 5 years, and if the interest rate were the same in either case, the first payment would include more dollars of interest under the 5-year amortization plan.
   c. The last payment would have a higher proportion of interest than the first payment.
   d. The proportion of interest versus principal repayment would be the same for each of the 5 payments.
   e. The proportion of each payment that represents interest as opposed to repayment of principal would be higher if the interest rate were higher.

____ 35. Problem deleted

____ 36. All else equal, if you expect to receive a certain amount in the future, say, $500 in ten (10) years, the *present value* of that future amount will be *lowest* if the interest earned on such investments is compounded
   a. daily
   b. weekly
   c. monthly
   d. quarterly
   e. annually

____ 37. Which of the following payments (receipts) would probably *not* be considered an annuity due? Based on your knowledge and using logic, think about the timing of the payments.
   a. rent payments associated with a five-year lease
   b. payments for a magazine subscription for a two-year period where the payments are made annually
   c. interest payments associated with a corporate bond that was issued today
   d. annual payments associated with lottery winnings that are paid out as an annuity

____ 38. Susan just signed a long-term lease on a townhouse in New York City (near Central Park) that requires her to make equal monthly payments for the next five years. The payments Susan has promised to make represent a(n) _____ for the landlord.
   a. ordinary annuity
   b. annuity due
   c. series of uneven cash flows
   d. perpetuity

____ 39. Suppose that the present value of receiving a *guaranteed* $450 in two years is $385.80. The opportunity rate of return on similar risk investments is 8 percent. According to this information, all else equal, which of the following statements is correct?
   a. It always would be preferable to wait two years to receive the $450 because this value is greater than the present value.
   b. Risk averse investors always would prefer to take the $385.80 today because it is a guaranteed amount whereas there is uncertainty as to whether the future amount will be paid.

c. No investor should be willing to pay more than $385.80 for such an investment.
d. It is apparent the present value was computed incorrectly because the present value of a future amount always should be greater than the future value.
e. None of the above is a correct answer.

____ 40. Vegit Corporation needs to borrow funds to support operations during the summer. Vegit's CFO is trying to decide whether to borrow from the Bank of Florida or the Bank of Georgia. The loan offered by Bank of Florida has a 12.5 percent simple interest rate with annual interest payments, whereas the loan offered by the Bank of Georgia has a 12 percent simple interest rate with monthly payments. Which bank should Vegit use for the loan and why?

____ 41. Alice's investment advisor is trying to convince her to purchase an investment that pays $250 per year. The investment has no maturity; therefore the $250 payment will continue every year forever. Alice has determined that her required rate of return for such an investment should be 14 percent and that she would hold the investment for 10 years and *then sell it*. If Alice decides to buy the investment, she would receive the first $250 payment one year from today. How much should Alice be willing to pay for this investment?

____ 42. At approximately what rate would you have to invest a lump-sum amount today if you need the amount to *triple* in six years? Assume interest is compounded annually.

____ 43. Problem deleted

____ 44. At an effective annual interest rate of 20 percent, how many years will it take a given amount to triple in value? (Round to the closest year.)

____ 45. What is the <u>future value</u> of a 5-year ordinary annuity with annual payments of $200, evaluated at a 15 percent interest rate?

____ 46. You have the opportunity to buy a perpetuity that pays $1,000 annually. Your required rate of return on this investment is 15 percent. You should be essentially indifferent to buying or not buying the investment if it were offered at what price?

____ 47. If $100 is placed in an account that earns a simple 4 percent, compounded quarterly, what will it be worth in 5 years?

____ 48. At an inflation rate of 9 percent, the purchasing power of $1 would be cut in half in 8.04 years. How long to the nearest year would it take the purchasing power of $1 to be cut in half if the inflation rate were only 4%?

____ 49. Gomez Electronics needs to arrange financing for its expansion program. Bank A offers to lend Gomez the required funds on a loan where interest must be paid monthly, and the quoted rate is 8 percent. Bank B will charge 9 percent, with interest due at the end of the year. What is the difference in the effective annual rates charged by the two banks?

____ 50. Assume that you can invest to earn a stated annual rate of return of 12 percent, but where interest is compounded semiannually. If you make 20 consecutive semiannual deposits of $500 each, with the first deposit being made today, what will your balance be at the end of Year 20?

____ 51. Assume you are to receive a 20-year annuity with annual payments of $50. The first payment will be received at the end of Year 1, and the last payment will be received at the end of Year 20. You will invest each payment in an account that pays 10 percent. What will be the value in your account at the end of Year 30?

____ 52. You just graduated, and you plan to work for 10 years and then to leave for the Australian "Outback" bush country. You figure you can save $1,000 a year for the first 5 years and $2,000 a year for the next 5 years. These savings cash flows will start one year from now. In addition, your family has just given you a $5,000 graduation gift. If you put the gift now, and your future savings when they start, into an account which pays 8 percent compounded annually, what will your financial "stake" be when you leave for Australia 10 years from now?

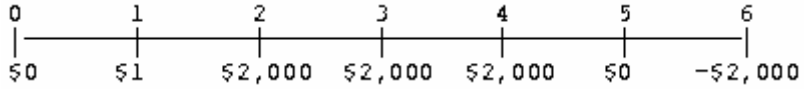
____ 53. As the winning contestant in a television game show, you are considering the prizes to be awarded. You must indicate to the sponsor which of the following two choices you prefer, assuming you want to maximize your wealth. Assume it is now January 1, and there is no danger whatever that the sponsor won't pay off.

(1) $1,000 now and another $1,000 at the beginning of each of the 11 subsequent months during the remainder of the year, to be deposited in an account paying 12 percent simple annual rate, but compounded monthly (to be left on deposit for the year).
(2) $12,750 at the end of the year.

Which one would you choose?

____ 54. You want to buy a Nissan 300ZX on your 27th birthday. You have priced these cars and found that they currently sell for $30,000. You believe that the price will increase by 5 percent per year until you are ready to buy. You can presently invest to earn 14 percent. If you just turned 20 years old, how much must you invest at the end of each of the next 7 years to be able to purchase the Nissan in 7 years?

____ 55. You are given the following cash flows. What is the present value (t = 0) if the discount rate is 12 percent?



____ 56. You are given the following cash flow information. The appropriate discount rate is 12 percent for Years 1–5 and 10 percent for Years 6–10. Payments are received at the end of the year.

Year	Amount
1–5	$20,000
6–10	$25,000

What should you be willing to pay right now to receive the income stream above?

____ 57. A project with a 3-year life has the following probability distributions for possible end of year cash flows in each of the next three years:

Year 1		Year 2		Year 3	
Prob	Cash Flow	Prob	Cash Flow	Prob	Cash Flow
0.30	$300	0.15	$100	0.25	$200
0.40	500	0.35	200	0.75	800
0.30	700	0.35	600		
		0.15	900		

Using an interest rate of 8 percent, find the expected present value of these uncertain cash flows. (Hint: Find the expected cash flow in each year, then evaluate those cash flows.)

____ 58. In its first year of operations, 1989, the Gourmet Cheese Shoppe had earnings per share (EPS) of $0.26. Four years later, in 1993, EPS was up to $0.38, and 7 years after that, in 2000, EPS was up to $0.535. It appears that the first 4 years represented a supernormal growth situation and since then a more normal growth rate has been sustained. What are the rates of growth for the earlier period and for the later period?

____ 59. Steaks Galore needs to arrange financing for its expansion program. One bank offers to lend the required $1,000,000 on a loan which requires interest to be paid at the end of each quarter. The quoted rate is 10 percent, and the principal must be repaid at the end of the year. A second lender offers 9 percent, daily compounding (365-day year), with interest and principal due at the end of the year. What is the difference in the effective annual rates (EFF%) charged by the two banks?

____ 60. Problem deleted.

____ 61. Problem deleted.

____ 62. Problem deleted.

____ 63. You want to borrow $1,000 from a friend for one year, and you propose to pay her $1,120 at the end of the year. She agrees to lend you the $1,000, but she wants you to pay her $10 of interest at the end of each of the first 11 months plus $1,010 at the end of the 12th month. How much higher is the effective annual rate under your friend's proposal than under your proposal?

____ 64. Suppose you put $100 into a savings account today, the account pays a simple annual interest rate of 6 percent, but compounded semiannually, and you withdraw $100 after 6 months. What would your ending balance be 20 years after the initial $100 deposit was made?

____ 65. A bank pays a quoted annual (simple) interest rate of 8 percent. However, it pays interest (compounds) daily using a 365-day year. What is the effective annual rate of return?

____ 66. You can deposit your savings at the Darlington National Bank, which offers to pay 12.6 percent interest compounded monthly, or at the Bartlett Bank, which will pay interest of 11.5 percent compounded daily. (Assume 365 days in a year.) Which bank offers the higher effective annual rate?

____ 67. You have just borrowed $20,000 to buy a new car. The loan agreement calls for 60 monthly payments of $444.89 each to begin one month from today. If the interest is compounded monthly, then what is the effective annual rate on this loan?

____ 68. Bank A offers a 2-year certificate of deposit (CD) that pays 10 percent compounded annually. Bank B offers a 2-year CD that is compounded semi-annually. The CDs have identical risk. What is the stated, or simple, rate that Bank B would have to offer to make you indifferent between the two investments?

____ 69. Assume that you inherited some money. A friend of yours is working as an unpaid intern at a local brokerage firm, and her boss is selling some securities which call for four payments, $50 at the end of each of the next 3 years, plus a payment of $1,050 at the end of Year 4. Your friend says she can get you some of these securities at a cost of $900 each. Your money is now invested in a bank that pays an 8 percent simple (quoted) interest rate, but with quarterly compounding. You regard the securities as being just as safe, and as liquid, as your bank deposit, so your required effective annual rate of return on the securities is the same as that on your bank deposit. You must calculate the value of the securities to decide whether they are a good investment. What is their present value to you?

____ 70. Your company is planning to borrow $1,000,000 on a 5-year, 15 percent, annual payment, fully amortized term loan. What percent of the payment made at the end of the second year will represent repayment of principal?

____ 71. The Desai Company just borrowed $1,000,000 for 3 years at a quoted rate of 8 percent, quarterly compounding. The loan is to be amortized in end-of-quarter payments over its 3-year life. How much interest (in dollars) will your company have to pay during the second quarter?

____ 72. You have a 30-year mortgage with a simple annual interest rate of 8.5 percent. The monthly payment is $1,000. What percentage of your total payments over the first three years goes toward the repayment of principal?

____ 73. Your company must make payments of $100,000 each year for 10 years, with the first payment to be made 10 years from today. To prepare for these payments, your company must make 10 equal annual deposits into an account which pays a simple interest rate of 7 percent, daily compounding (360-day year). Funds will remain in the account during both the accumulation period (the first 10 years) and the distribution period (the last 10 years), and the same interest rate will be earned throughout the entire 20 years. The first deposit will be made immediately. How large must each deposit be?

____ 74. Your lease calls for payments of $500 at the end of each month for the next 12 months. Now your landlord offers you a new 1-year lease which calls for zero rent for 3 months, then rental payments of $700 at the end of each month for the next 9 months. You keep your money in a bank time deposit that pays a simple annual rate of 5 percent. By what amount would your net worth change if you accept the new lease? (Hint: Your return <u>per month</u> is 5%/12 = 0.4166667%.)

____ 75. You plan to invest $2,500 in a money market account which will pay an annual stated (simple) interest rate of 8.75 percent, but which compounds interest on a weekly basis. If you leave this money on deposit for one year (52 weeks), what will be your ending balance when you close the account?

Chapter 3 Self Study Questions
Answer Section

TRUE/FALSE

1. ANS: F DIF: Easy TOP: Cash flow time lines
2. ANS: T DIF: Easy TOP: Retirement and compounding
3. ANS: F DIF: Easy TOP: Time value concepts
4. ANS: F DIF: Easy TOP: Coupon rate
5. ANS: T DIF: Easy TOP: Perpetuity
6. ANS: T DIF: Easy TOP: Amortization
7. ANS: F DIF: Medium TOP: Compounding
8. ANS: T DIF: Medium TOP: Comparative compounding
9. ANS: T DIF: Medium TOP: Uneven cash flows and interest
10. ANS: F DIF: Medium TOP: Amortization
11. ANS: F DIF: Medium TOP: Effective and simple rates
12. ANS: F DIF: Medium TOP: Lump sum and annuity
13. ANS: T DIF: Medium TOP: Annuities
14. ANS: T DIF: Medium TOP: Annuities
15. ANS: T DIF: Medium TOP: Annuities
16. ANS: F DIF: Medium TOP: Effective annual rate

MULTIPLE CHOICE

17. $58,275. DIF: Easy OBJ: TYPE: Problem TOP: PV and continuous compounding
18. Problem deleted
19. $975.01 Medium
20. $2.25 Medium
21. 12.5% Medium
22. $2000 Medium
23. 4.04% Medium
24. $368 Medium
25. $40,774 Medium
26. ANS: B DIF: Easy
27. ANS: A DIF: Easy
28. Problem deleted
29. ANS: B DIF: Easy
30. annuity due Easy
31. ANS: A DIF: Easy
32. Problem deleted
33. Problem deleted
34. ANS: E

If the interest rate were higher, the payments would all be higher, and all of the increase would be attributable to interest. So, the proportion of each payment that represents interest would be higher.

Note that statement b is false because interest during Year 1 would be the interest rate times the beginning balance, which is $10,000. With the same interest rate and the same beginning balance, the Year 1 interest charge will be the same, regardless of whether the loan is amortized over 5 or 10 years.

35. Problem deleted
36. ANS: E DIF: Medium
37. ANS: C DIF: Medium
38. ANS: B DIF: Medium
39. ANS: C DIF: Medium
40. Florida EAR = 12.5; Georgia EAR = 12.7% DIF: Medium
41. $785.71 DIF: Medium
42. 20% Medium
43. Problem deleted
44. 6 years Easy
45. $1,348.48. Easy
46. $6,666.67 Easy
47. $122.02 Easy
48. n ≈ 18 years Easy
49. 0.70% Easy
50. $62,527.47 Medium
51. $7,427.71 Medium
52. $31,148 Medium
53. $PV_{Choice\ 1}$ = $11,367.60; $P_{Choice\ 2}$ $11,314.35 Medium
54. $3,933.93 Medium
55. $3,277 Medium
56. $125,870 Medium
57. $1,347.61 Medium
58. 10%; 5% Medium
59. .96% Medium
60. $2,779.58 Tough
61. $792.49 Tough
62. $7,153.56 Tough
63. 12.68% Easy
64. $9.50 Medium
65. 8.33% Medium
66. $EAR_{Darlington}$ = 13.354%; $EAR_{Bartlett}$ = 12.185%; Medium
67. 12.68% Medium
68. 9.76% Medium
69. $893 Medium
70. 57.18% Medium
71. $18,508.81 Medium
72. 8.94% Medium
73. $49,661.86 Medium
74. -$253 Medium
75. $2,728.50 Medium