



7. Present value is defined as:
- future cash flows discounted to the present by an appropriate discount rate.
  - inverse of future cash flows.
  - present cash flows compounded into the future.
  - future cash flows multiplied by the factor  $(1 + r)^t$ .
  - None of the answers listed above is above.
8. A perpetuity is:
- a stream of equal payments at unequal time intervals.
  - a stream of equal payments at equal time intervals.
  - a stream of equal payments that continue forever.
  - all of the above.
  - none of the above.
9. What concept involves earning interest on interest in addition to interest on the principal or initial investment?
- Discounting
  - The principal value
  - Inflation
  - Compounding
  - Amortization
10. What type of annuity exists when the equal payments or receipts occur at the beginning of each time period?
- An ordinary annuity.
  - A basic annuity.
  - An annuity due.
  - A compound annuity.
  - An amortized annuity.
11. \_\_\_\_\_ is repaid in equal payments over a specified time period.
- An adjustable loan mortgage loan.
  - An amortized loan.
  - An adjustable interest residential real mortgage loan.
  - An ARS loan.
  - A collateralized loan.
12. Assuming a discount rate of 6% p.a., the present value of \$1000 to be received exactly ten years from today is \_\_\_\_\_.
- \$551.82
  - \$558.39
  - \$568.27
  - \$553.68
  - None of the answers listed above is within \$0.10 of the correct answer.
13. Assuming a discount rate of 6% p.a., but with monthly compounding, the present value of \$1000 to be received exactly ten years from today is \_\_\_\_\_.
- \$551.82
  - \$558.39
  - \$568.27
  - \$553.68
  - None of the answers listed above is within \$0.10 of the correct answer.

14. In which case will an investor receive the most interest (i.e., which of the following rates has the largest effective annual return)?
- 4.14% p.a., compounded semiannually.
  - 4.12% p.a., compounded every 2 months (i.e., 6 times per year).
  - 4.09% p.a., compounded monthly.
  - 4.05% p.a., compounded daily (assume 365 days per year).
  - 4.00% p.a., compounded continuously.
  - There is not enough information provided to correctly answer this question.
15. In which case will an investor receive the most interest:
- 16.14% p.a., compounded semiannually.
  - 16.12% p.a., compounded every 2 months (i.e., 6 times per year).
  - 16.09% p.a., compounded monthly.
  - 16.05% p.a., compounded daily (assume 365 days per year).
  - 16.00% p.a., compounded continuously.
  - There is not enough information provided to correctly answer this question.
16. The present value of a future amount (assuming positive interest rates and a time difference between the present and the future of greater than one year):
- will always be less than the future amount.
  - can be calculated precisely if the discount rate and number of periods is known.
  - is greater than the future value.
  - both a. and b. above are true.
  - None of the statements above are correct.
17. In 2 years, you are to receive \$10,000. If the interest rate were to suddenly increase, the present value of that future amount to you would \_\_\_\_\_
- decrease.
  - increase.
  - remain unchanged.
  - increase if the amount is to be received in less than 10 years; decrease if the amount is to be received in more than 10 years.
  - The correct answer cannot be determined without more information.
18. Assume that the interest rate is greater than zero. Which of the following cash-inflow streams totaling \$1,500 would you prefer? The cash flows are listed in order for Year 1, Year 2, and Year 3 respectively.
- \$700 in Year 1; \$500 in Year 2; \$300 in Year 3
  - \$300 in Year 1; \$500 in Year 2; \$700 in Year 3
  - \$500 in Year 1; \$500 in Year 2; \$500 in Year 3
  - \$0 in Year 1; \$0 in Year 2; \$1400 in Year 3
  - Any of the above, since they each sum to \$1,500.
19. Assume that the interest rate is equal to zero (i.e., 0%). Which of the following cash-inflow streams totaling \$1,500 would you prefer? The cash flows are listed in order for Year 1, Year 2, and Year 3 respectively.
- \$700 in Year 1; \$500 in Year 2; \$300 in Year 3
  - \$300 in Year 1; \$500 in Year 2; \$700 in Year 3
  - \$500 in Year 1; \$500 in Year 2; \$500 in Year 3
  - \$0 in Year 1; \$0 in Year 2; \$1400 in Year 3
  - Any of the above, since they each sum to \$1,500.

20. Which of the following will increase the future value of the mixed cash flows for years 1 through 5 of \$9,000; \$4,000; \$1,000; \$5,000; and \$2,000 respectively given a 10% discount rate? (There **may** be more than one correct answer for this question; you **MUST** enter all of the correct answer choices, and only the correct answer choices, to receive any credit – that is, this is an “all or nothing” question).
- Increase the discount rate by 2%.
  - Switch cash flows for years 1 and 5 so that year 1 is \$2,000 and year 5 is \$9,000.
  - Switch cash flows for years 2 and 4 so that year 2 is \$5,000 and year 4 is \$4,000.
  - Switch cash flows for years 2 and 5 so that year 2 is \$2,000 and year 5 is \$4,000.
  - Switch cash flows for years 3 and 4 so that year 3 is \$5,000 and year 5 is \$1,000.
  - Decrease the discount rate by 2%.

**Part II: PROBLEMS** – Compute a final numerical answer for each of the following problems. Unless specifically instructed in a question to do otherwise, round all dollar answers to 2 decimal places, round time (years or months) answers to one (1) decimal place and record interest rates as percent values rounded to one (1) decimal place. However, be sure to **NOT** input a dollar sign, commas, or a percent sign on iCollege. For example, record \$3,284.33965 as 3284.34, record 37.285432 years as 37.3 and record .064358 = 6.4358% as 6.4.

21. On July 1, 2020, the world’s population was 7,794,798,739. If the global annual growth rate in population averages 1.1% p.a. over the next 50 years, what will the world’s population be on July 1, 2070?
22. If exactly 45 years ago a gallon of milk costs \$0.50 and if, today, a gallon of milk costs \$3.50, what was the annual compounded inflation rate in the price of milk (i.e., the p.a. rate) over the past 45 years?
23. What is the future value on the day of the last deposit of 20 annual deposits of \$500 per year (first deposit to be made today) given an interest rate of 6.75% p.a.?
24. What is the future value exactly 25 years after the last deposit of 20 annual deposits of \$500 per year (first deposit to be made exactly one year from today) given an interest rate of 6.75% p.a.?
25. Assume that I will deposit \$750 into an account exactly 10 years from today. How much will be in my account at the end of year 50 (i.e., 50 years from today), assuming that my account pays interest of 6.25% p.a., but with daily compounding?
26. Assume that when you graduate from college you decide to buy a new car. The GSU credit union offers to provide financing for 60 months at a 6.35 percent annual rate, compounded monthly. You must make a down payment of 15 percent of the \$28,200 purchase price in cash to the dealer. The credit union will be used to finance the remaining 85 percent of the purchase price with the first payment due exactly one month from today. What will be your monthly payment?
27. You have just agreed to a new loan and have purchased a \$2,420 computer today. The loan has a 22.6% annual interest rate, compounded monthly. The minimum monthly payment is \$78, and you do not expect to ever pay more than the minimum payment. Assuming no additional charges or costs will occur with this loan, approximately what will you owe on the loan at the end of 3 years (36 months) when you expect to need to purchase another new computer?
28. What is the present value of a perpetuity that pays \$1,000 every year, with the first cash flow occurring today if the appropriate interest rate for this perpetuity is 6.95% p.a.?
29. Assume that you want to have \$1,000,000 when you plan to retire exactly 38 years from today. You expect to earn 10.65% p.a., compounded monthly, over the entire 38-year period. How much extra money per month must you deposit if you choose to fund your retirement account using an ordinary annuity technique rather than an annuity due technique?

30. You expect to deposit the following cash flows at the end of years 1 through 5, \$1,000; \$4,000; \$9,000; \$5,000; and \$2,000 respectively. What is the future account value at the end of year 6 if you can earn 10% p.a., compounded annually?
31. Congratulations! You just won a contest at a local business that paid you exactly \$7,500. You have decided to invest these funds, starting today, for 45 years until you retire. During this time, you believe that your account will earn 12.5% p.a., compounded annually, every year. As soon as you retire (exactly 45 years from today) you will start withdrawing retirement funds every year for an additional 33 years (with the first withdrawal made exactly 45 years from today), but during your retirement years, you believe that your account will earn a more conservative 6.6% p.a., compounded annually. What is maximum equal annual amount that you will be able to withdraw each year in retirement?
32. The ShortHolder bank pays 5.60% p.a., but with daily compounding assume a 360-day year), on a 9-month certificate of deposit. If you deposit \$14,000 you would expect to earn \_\_\_\_\_ in interest (rounded to the nearest dollar).
33. What is the future value **at the end of year 14** of a \$20,000 invested today into an account that 6.75% p.a., but with continuous compounding?
34. For \$650,000 Laura Croft can purchase a 15-year ordinary annuity that will pay her a yearly payment of \$57,200 (every year for 15 years). What is the annual interest rate implicit in this investment? Round your answer to the nearest tenth (for example, record 0.4325 as 43.3% - but do not include the percent sign in iCollege).
35. Nathan Drake is considering borrowing \$2850,000 for 20 years at a compound annual interest rate of 6.59% p.a. The loan agreement calls for **20 equal annual payments**, to be paid at the end of each of the next 20 years (payments include both principal and interest.) What is the annual payment that will fully amortize Nathan's loan?
36. Cloud Strife is going to deposit \$126,250 into a certificate of deposit (CD) that pays 6% p.a., but with quarterly compounding. How much money will Cloud receive when the CD matures exactly 80 months from today?
37. Clementine and Lee expect to deposit the following cash flows at the end of years 1 through 5, \$6,000; \$5,000; \$4,000; \$3,000; and \$2,000 respectively. Alternatively, they could deposit a single amount today and have the same amount in their account at the end of year 5. How large does the single deposit need to be today if Clementine and Lee can earn 10% p.a. on their account?
38. Ellie is evaluating an investment (that Joel told her about) that will provide the following returns at the end of each of the following years: year 1 = \$12,500; year 2 = \$10,000; year 3 = \$7,500; year 4 = \$5,000; year 5 = \$2,500; year 6 = \$1000; and year 7 = \$500. Ellie believes that she can earn an annual rate of 8% p.a. on this investment. Assuming Ellie is correct, what is the maximum amount that Ellie should pay for this investment today?
39. Marcus Holloway has \$7500 that he will use as a down payment on a car. Assuming that he can afford a payment of \$625 per month, how much can Marcus spend on a car (that is, what is the **total cost** of the car that Marcus can purchase) if the interest rate is 5.75% and if he will finance his purchase with a 5 year, monthly payment loan?
40. Suppose Link deposits \$5,000 into an account earning 8.575 percent interest, compounded monthly. How many years (rounded to one decimal place – for example, 32.1843 year = 32.2) will it take for Link 's account to be worth \$20,000?
41. Suppose Crash Bandicoot deposits \$5,000 into an account earning 4.875% p.a., compounded monthly, and Crash also make monthly contributions of \$250 (first monthly contribution made one month after the initial deposit is made). How many years (rounded to one decimal place – for example, 32.1843 year = 32.2) will it take for the account to grow to \$16,000?

42. Assume that Ratchet and Clank are trying to borrow money from you to finance their new business. Assume that Ratchet and Clank promise to repay you in four installments, one payment of \$5,000 to be made exactly 2 years from today, a second payment of \$10,000 to be made exactly 5 years from today, a third payment of \$15,000 to be made exactly 9 years from today, and a final payment of \$21,000 to be made exactly 13 years from today. If your opportunity cost of funds is 7.5% p.a., (that is, use an interest rate of 7.5% for this question), how much should you be willing to lend Ratchet and Clank today?
43. What is the future value at the end of year 28 of depositing \$5,000 today, \$3,500 at the end of years 1, 2 and 3, \$5,000 at the end of years 4, 5, 6 and 7 and \$4,250 at the end of years 8, 9, 10, 11 and 12 into an account that pays 7.75% p.a.? (No deposits will be made into the account after year 12).
44. If Lisa Hamilton wants to fund a scholarship that would pay \$18,500 per year forever at GSU, how much would Lisa have to deposit today if she wanted the scholarship to start paying six (6) years from today? Assume the endowment could earn 4.25% p.a. interest forever.
45. Kratos currently owes \$31,000 on a car loan at 4.25 percent interest. If Kratos makes monthly payments of \$596.59 per month, how long (i.e., number of months rounded to one decimal place) will it take him to fully repay the loan?

**USE THE INFORMATION BELOW TO ANSWER THE FOLLOWING THREE QUESTIONS**

Vito Scaletta just bought his dream car, a 2021 Bugatti Divo, that cost \$5,832,000. He paid \$750,000 down and financed the balance over 60 months at 4.75% p.a. (Assume that Vito makes all required payments on time).

46. What is the monthly payment on Vito's loan?
47. What will the balance on Vito's loan be at the end of the fourth year (that is, immediately after Vito makes his 48<sup>th</sup> payment on the loan)?
48. What is the total amount of interest that Vito will pay over the entire term of the loan (that is, the total amount of interest that is paid on payments 1 through 60)?
49. Today is your 25<sup>th</sup> birthday and you have a dream of retiring on your 65<sup>th</sup> birthday. You want to put aside however much is necessary on your 31<sup>st</sup> through 65<sup>th</sup> birthdays (35 annual payments) to have enough to retire. You've estimated that you will live until you are 90 and you want the first withdrawal to occur on your 66<sup>th</sup> birthday, with the last payment occurring on your 90<sup>th</sup> birthday. You think that you will need \$175,000 per year to spend during retirement. You estimate constant interest rates of 10.75%. Assuming that you currently have \$10,000 deposited in your retirement account, how much must you put aside each year in order to have sufficient money to retire at age 65?
50. Daigo Dojima recently invested **\$5,500** in a project that is promising to return 3.25 percent per year. The cash flows are expected to be as follows:

<u>End of Year</u>	<u>Cash Flow</u>
1	\$1000
2	950
3	875
4	???
5	850

Note that the 4<sup>th</sup> year cash flow is unknown. Assuming the present value of this cash flow stream is \$5,500 (that is, CF<sub>0</sub> = -5500), what is the missing cash flow value (that is, what is the cash flow at the end of the 4<sup>th</sup> year)?