Level I Study Handbook Sample

The UpperMark *Study Handbooks* for Level I are comprised of 3 Volumes, each covering about 10 Topics from the CAIA curriculum. This is a sample of one of the Topic chapters. You will notice the material is very comprehensive, yet focused, and clearly presented.

> Keywords and learning objective statements are in ***bold italics*** so they stand out.

> Formulas are explained and clear examples given for any calculation problem.

> Keystrokes for both financial calculators approved for use during the CAIA exam are also provided, saving you invaluable time.

> Each Topic chapter ends with a set of sample test questions, with detailed answers. The *Study Handbooks* have a total of over 320 practice test questions in them.

After studying the material in the *Study Handbooks*, we recommend candidates practice and test their knowledge using our *TestBank* software. TestBank currently has over 1200 test questions, which are *not* the same as the questions in the *Handbooks*.

> Use *TestBank*'s exclusive feature to include all the questions from the *Handbooks* in your *TestBank* database. This enables you to have all 1500+ practice questions in one place.

> We add new questions to *TestBank* during the exam season.

> *TestBank* enables clients to generate their own highly customized tests. The software application also creates tests that simulate the CAIA exams – the only product in the market with this feature.

> There are no limits to the number of tests you can create and take. You can even print tests and later enter your responses and have the tests scored. You can create tests based on questions you've gotten incorrect in the past. And much more!

> Please take a moment to check out the demo of *TestBank* on our website at www.uppermark.com/samplesAndDemos.php.

Each Topic in the curriculum is presented as a separate chapter.

Topic 16

Introduction to Real Estate Valuation

The main points from the CAIA Study Guide are presented for each Topic.

Main Points

Discounting and compounding, discounted cash flow valuation, investment decision rules, loan amortization, pro forma analysis, and company valuation.

L.O. 1. Calculate the future value of a lump sum cash flow.

The ***future value at time-t of a lump sum cash flow*** is denoted by FV_t and is given by:

$$FV_t = CF_0(1+r_1)(1+r_2)\ldots(1+r_t),$$

where CF_0 is the cash flow invested at time 0 and r_t is the interest rate earned in year t. In situations where the interest rate is the same in each subsequent year, that is, $r_1 = r_2 = \ldots = r_t = r$, the future value may be expressed as:

$$FV_t = CF_0(1+r)^t.$$

Note that the time units used for the variables in the above equations must be the same. For instance, if the lump sum is invested each quarter, the interest rate used in the formulas must represent quarterly units. This valuation process uses the ***time value of money***, which maintains that the value of a dollar received today is greater than a dollar received tomorrow.

Learning Objective statements are clearly set off from text in easy-to-locate grey boxes.

Example 1

What is the future value of $4000 after two years if the annual rate of interest in year one is 6.5% and the …

Headers reference the Topic number and name for easy navigation through chapters.

Example 2

A real estate property that generates $31,000 per year is held for 24 years and then sold for $2 million. If the annual discount rate is 3.4% each year, what is the property to its owner?

Examples are provided for all Learning Objectives that involve a calculation.

Each example provides detailed solutions.

Here the cash flows represent an annuity – the *same* cash flow of $31,0 can use the annuity formula.

$$\text{Present Value} = \text{CF}\left(\frac{1}{r} - \frac{1}{r(1+r)^n}\right) + \frac{\text{Final Value}}{(1+r)^n}$$

$$= \$31{,}000\left(\frac{1}{0.034} - \frac{1}{0.034(1+0.034)^{24}}\right) + \frac{\$2{,}000{,}000}{(1+0.034)^{24}}$$

$$= \$1{,}399{,}551.32.$$

"Note" sections provide valuable insight and guidance.

Note 1: Problems involving annuities are more easily solved using the *time value of money* functionality of a financial calculator.[1] The keystrokes for Example 2 are provided below.

TI BAII Plus: **24 N 3.4 I/Y 31,000 PMT 2,000,000 FV CPT PV**
HP-12C: **24 n 3.4 i 31,000 PMT 2,000,000 FV PV**

Note 2: The result can also be attained using the *cash flow* functionality of a financial calculator, with the steps shown below. Notice that the last cash flow in year 24 is the sum of $2 million and $31,000, and $31,000 is received in each of the prior 23 years.

You should use whichever approach is easiest or most logical for you. For present value problems involving annuities, the 'time value of money' tends to be preferable, since you do not have to worry about remembering that you have two cash flows at the last time period.

TI BAII Plus	HP-12C
CF (for cash flow worksheet)	**REG** (to clear previous data)
2nd CLR Work (to clear previous data)	
CF_0: **0 ENTER** ↓	**0 CF0**
CF_1: **31,000 ENTER** ↓	**31,000 CFj**
F_1: **23 ENTER** ↓	**23 nj**
CF_2: **2,031,000 ENTER** ↓	**2,031,000 CFj**
F_2: ↓	
NPV 3.4 ENTER ↓ **CPT**	**3.4 i**
=> will give NPV = 1,399,551.32.	**NPV** => will give NPV =

Calculator keystrokes are provided for calculation problems.

Keystrokes are specific to the two calculators permitted by the CAIA Association: the TI BAII Plus and the HP-12C.

These are provided so you do not have to take time to work through your calculator manual!

Footnotes offer further clarification.

Now suppose you own a property for which you do not know the future se most often the case) or for which the last cash flow is not stabilized but grows present value of the property would again be the discounted future cash flows, where, in this case,

[1] This set of keys only works for annuities, not for *uneven* cash flows. The cash flow keys can be used for *any* type of cash flows.

the last set of cash flows would be increasing. If there is no foreseeable limit to the cash flows and there is no particular growth rate, valuing the property would involve summing an infinite number of cash flows, as illustrated below.

$$PV = \frac{\$36{,}000}{(1+0.05)} + \frac{\$36{,}000}{(1+0.05)^2} + \frac{\$40{,}000}{(1+0.05)^3} + \frac{\$40{,}000}{(1+0.05)^4} + \frac{\$46{,}000}{(1+0.05)^5} + \frac{\$58{,}000}{(1+0.05)^6} + \frac{\$63{,}000}{(1+0.05)^7} + \cdots$$

However, if the rate of growth of the cash flows is constant after some time, finding the value of the cash flows at that time reduces to a simple formula (discussed in L.O. 4) that makes valuing the property much easier. In this case, the present value of the property reduces to the sum of the discounted cash flows received prior to when the constant growth rate began $\left(\sum_{i=1}^{t} \frac{CF_i}{(1+r)^i}\right)$ and the discounted "terminal value", which represents [illegible]h flows that grow at a constant rate in perpetuity.

$$PV = \sum_{i=1}^{t} \frac{CF_i}{(1+r)} \qquad (1+r)$$

The simple formula for calculating the terminal value is presented in L.O. 4.

Keywords and significant terms are indicated in ***bold italics.***

L.O. 4. Calculate the reversion value of a property.

The ***reversion value***, also referred to as the *terminal value*, of a property depicts the value of all future cash flows beyond an investment exit date. It is the value that investors can expect to realize upon exiting the investment at some future date. It is usually estimated by applying a cap rate to a stabilized ***net operating income*** (NOI).

If the NOI stabilizes at year t and then grows at a given rate in perpetuity, the reversion value of the investment property would be given as:

$$\text{Reversion Value at end of year } t = \frac{NOI_{t+1}}{r-g},$$

where NOI_{t+1} is the NOI in year $t + 1$, r is the required return of the cash flows after the exit date, that is, after the cash flows have stabilized, and g is the growth rate of the NOI after the stabilization date. So, the terminal value in a given year is 'next year's' NOI divided by $r - g$.

Example 1

Suppose you expect to sell your property at the end of seven years and you project that the property will generate a net operating income of $4,800,000 in year 7, which will grow at 1.5% per year thereafter. If the appropriate discount rate for the cash flows from the property is 14%, what is the property's expected reversion value at the end of year 7?

Formulas are clearly explained and the variables defined.

Keywords & Learning Objectives

Keywords

Amortization {p. 215}
Cap ex {p. 47}
Cap rate {p. 112}
Discounted cash flows {p. 203}
Earnings before interest, taxes, depreciation, and amortization (EBITDA) {p. 108-9}
Funds from operations {p. 110}
Internal rate of return (IRR) {p. 210}
Lease analysis {p. 37}
Levered cash flow {p. 51}
Net asset value (NAV) {p. 112}
Net operating income (NOI) {p. 44}
Net present value (NPV) {p. 208}
Overage {p. 39}
Recoveries {p. 40}
Reversion value {p.
Roll-up {p. 106}
Tenant improvements {p. 45}
Time value of money {p. 198}
Vacancy {p. 38}

Each chapter ends with the keywords and Learning Objectives from the CAIA Study Guide.

Learning Objectives

The candidate should be able to:

1. Calculate the future value of a lump sum cash flow. *{p. 198-201}*
2. Calculate the present value of a lump sum cash flow. *{p. 201-4}*
3. Calculate the value of a property using discounted cash flows. *{p. 203-8}*
4. Calculate the reversion value of a property. *{p. 204-7}*
5. Explain the net present value rule. *{p. 208-9}*
6. Calculate the net present value of a real estate project. *{p. 208-9}*
7. Explain the internal rate of return rule (IRR). *{p. 210-2}*
8. Calculate the IRR on a real estate project. *{p. 210-5}*
9. Understand the shortcomings of the IRR rule. *{p. 211-2}*
10. Explain the amortization of a real estate loan. *{p. 215-6}*
11. Calculate the annual payment of a real estate loan. *{p. 217-8}*
12. Describe the effect of amortization on after-tax cash flows. *{p. 219-21}*
13. Describe a negative amortization loan. *{p. 222-3}*
14. Calculate the total rental income of a real estate project. *{p. 37-40}*
15. Explain vacancy and its impact on rental revenue. *{p. 38-9}*
16. Calculate the operating expenses of a real estate project. *{p. 40-4}*
17. Define tenant improvements and capital expenditures. *{p. 45}*
18. Calculate the depreciation for a real estate project. *{p. 47-50}*
19. Explain the effect of leverage on the cash flow to equity of a real estate project. *{p. 51-4}*
20. Explain key differences between a company analysis and a property analysis. *{p. 106}*
21. Explain why the value of a real estate company may not be the same as the value of its properties. *{p. 109-10}*
22. Calculate the value of a real estate company using the following three approaches: *{p. 111-4}*
    a. discounted cash flow.
    b. cap rate.
    c. net asset value (NAV).
23. Explain the NAV approach to valuing a real estate company. *{p. 112-3}*
24. Describe the sensitivity of the NAV to the cap rate. *{p. 114}*

Page numbers to the original text are provided for easy reference.

Topic 16 – Personal Study Notes

Topic 16 – Practice Test Questions

1. You expect to sell your property at the end of five years. The property is expected to generate a net operating income of $750,000 in year 5 that will grow at 3% a year thereafter. What is the property's expected reversion value if the discount rate is 9%?

   A. $6,250,000
   B. $6,437,500
   C. $12,500,000
   D. $12,875,000

Practice test questions are provided at the end of each chapter.

2. The net present value (NPV) rule postulates that:

   A. the NPV of a good property investment is higher than its acquisition cost.
   B. investors should choose the project with the lowest NPV, all else equal.
   C. a good investment is one with a positive NPV.
   D. NPV is the only measure that matters when making a property investment decision.

The *Study Handbooks* have over 320 practice test questions.

Also, use our *TestBank* software's exclusive feature to include all of these questions in your *TestBank* database.

3. Given a discount rate c…at costs $12,300,000, is expected to produce a ne…0,000, and $6,008,000 in the next four years, resp…at the end of the fourth year?

   A. $5,251,333
   B. $7,002,308
   C. $9,140,332
   D. $13,849,982

The answer key provides both the correct answer and the Learning Objective addressed.

This is important so that you can know what material to review if you need further practice.

Detailed explanations are provided for each practice test question.

Where appropriate, calculator keystrokes are also provided.

Topic 16 – Answers & Explanations

Question Number	Answer	Learning Objective	Explanation
1.	D	4	Property's reversion value at end of year 5 is: $\frac{NOI_6}{r-g} = \frac{\$750,000(1+0.03)}{0.09-0.03} = \$12,875,000.$
2.	C	5	The NPV of a project represents the value that the project will add to an investment. So, the NPV rule maintains that projects with positive NPV should be selected. If more than one project qualifies, the project with the maximum NPV is selected, unless there are other considerations.
3.	D	6	NPV = PV of Cash Flow – Initial Investment $= \frac{\$3,120,000}{(1+0.12)} + \frac{\$4,870,000}{(1+0.12)^2} + \frac{\$5,310,000}{(1+0.12)^3} + \frac{\$6,008,000 + \$18,700,000}{(1+0.12)^4} - \$12,300,000$ $= \$2,785,714.29 + \$3,882,334.18 + \$3,779,553.12 + \$15,702,380.68 - \$12,300,000$ $= \$13,849,982.27.$ This result can be attained using the cash flow functionality of a financial calculator.

TI BAII Plus	HP-12C
CF (for cash flow worksheet) **2nd CLR Work** (to clear previous data) –12,300,000 **ENTER** ↓ 3,120,000 **ENTER** ↓ ↓ 4,870,000 **ENTER** ↓ ↓ 5,310,000 **ENTER** ↓ ↓ 24,708,000 **ENTER** ↓ ↓ **NPV** 12 **ENTER** ↓ **CPT** => gives NPV = 13,849,982.27.	**REG** (to clear previous data) –12,300,000 **CHS CF0** 3,120,000 **CFj** 4,870,000 **CFj** 5,310,000 **CFj** 24,708,000 **CFj** 12 **i** **NPV** => gives NPV = 13,849,982.27.

Each *Study Handbook* has a comprehensive index of key terms.

Index

The index can be used as an extra study tool to test your knowledge of key terms.