

Real Estate Investment Analysis
Fall 2002

Midterm Exam 1 – Version A – Solutions

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Tu-Th 11:00-12:15

1) (11 points) Dante has been analyzing a warehouse property. This property is available to purchase for \$1.26 million and its first-year expected NOI is \$165,000. NOI is expected to increase by 3 percent per year indefinitely, and Dante expects to be able to sell the property at the end of the 5th year at a 12 percent cap rate, based on year 6 expected NOI.

a) (7 points) If Dante purchases this property and holds it for five years, what is the NPV of this investment, assuming a 20 percent discount rate.

First calculate the NOI for this property through the 6th year:

Year 1	\$165,000
Year 2	169,950
Year 3	175,049
Year 4	180,300
Year 5	185,709
Year 6	191,280

Next, calculate the anticipated sale price based on year-6 NOI:

$$P = 191,280 / 0.12 = \$1,594,002.$$

Finally, enter the following values into your irregular cash flow worksheet and solve for NPV:

n	\$
0	-1,260,000
1	165,000
2	169,950
3	175,049
4	180,300
5	1,779,711

At a 20 percent discount rate, the NPV of this investment is – \$101,002.

b) (2 points) What is the internal rate of return of this investment?

$$\text{IRR} = 17.52\%.$$

c) (2 points) What price should Dante pay in order to ensure he earns his 20 percent required rate of return?

To solve this, calculate the present value of the cash flows that occur after date 0. In other words, set $CF_0 = 0$ and solve for NPV at a 20 percent discount rate.

Doing this gives us \$1,158,999, or \$1.159 million. Notice that the same answer can be had by subtracting the \$101,002 (the negative NPV at the original purchase price) from the original purchase price of \$1.26 million.

2) (16 points) Consider the following two mutually exclusive projects:

Project A		Project B	
n	\$	n	\$
0	(75,000)	0	(25,000)
1	12,000	1	5,000
2	(10,000)	2	5,000
3	150,000	3	(8,000)
		4	30,000
		5	50,000

a) (6 points) Calculate the NPV and IRR for each of these projects. Assume a 12% discount rate. Which project is preferred based on its NPV? Which is preferred based on its IRR?

$$NPV_A = \$34,509$$

$$IRR_A = 27.88\%$$

$$NPV_B = \$25,193$$

$$IRR_B = 32.71\%$$

Based on NPV, Project A is preferred. Based on IRR, Project B is preferred.

b) (10 points) Use the capital accumulation method to determine which of the projects is preferred. Assume a reinvestment rate of 12% and a safe rate of 4%.

Begin by discounting back negative cash flows at the safe rate until they are completely covered by positive cash flows or brought to date 0.

Project A	
n	\$
0	(75,000)
1	12,000
2	(10,000)
3	150,000

+ (9,615) = 2,385

Next, compound forward positive cash flows using the reinvestment rate to the terminal date.

Project A	
n	\$
0	(75,000)
1	2,385
2	0
3	150,000
4	
5	

188,160 + 3,753 = 191,913

Follow the same process for Project B:

Project B	
n	\$
0	(25,000)
1	5,000
2	5,000
3	(8,000)
4	30,000
5	50,000

$+ (7,692) = (2,692)$
 $+ (2,589) = 2,411$
 $+ 33,600 + 3,794 = 87,394$

Finally, adjust for differences in the initial investment amounts:

Project B	
n	\$
0	(25,000)
1	0
2	0
3	0
4	0
5	87,394

$+ (50,000)$
 $+ 88,117 = 175,511$

Thus, the two projects provide the following capital accumulations. Based on these calculations, Project A is preferred.

Project A		Project B	
n	\$	n	\$
0	(75,000)	0	(75,000)
1	0	1	0
2	0	2	0
3	0	3	0
4	0	4	0
5	191,913	5	175,511

- 3) (13 points) Trent is considering investing in a commercial office building in east Wichita. The building has 120,000 square feet of gross leasable area. Of this, 35,000 square feet rent for \$17.50 per square foot (psf), 65,000 square feet rent for \$16.00 psf, while the remaining 20,000 square feet rent for \$15.25 psf. All leases in this building are gross leases. Currently, the average vacancy rate for similar office space in east Wichita is 12%. The asking price for this property is \$10 million.

Annual operating expenses are expected to be as follows:

Utilities	\$195,170
Maintenance	185,000
Management expenses	10% of EGI
Property insurance	135,000
Property taxes	260,000

- a) (5 points) Write out the pro forma operating statement for this property. What is its expected net operating income?

Potential gross income		
35,000 @ 17.50	\$612,500	
65,000 @ 16.00	1,040,000	
20,000 @ 15.25	305,000	1,957,500
Less: Vacancy & collection		(234,900)
Effective gross income		1,722,600
Operating expenses		
Utilities	195,170	
Maintenance	185,000	
Management expenses	172,260	
Property insurance	135,000	
Property taxes	260,000	(947,430)
Net operating income		775,170

- b) (2 points) At what cap rate is the seller offering this property?

$$r = \text{NOI} / V = 775,170 / 10,000,000 = 0.0775 = 7.75 \text{ percent.}$$

- c) (2 points) Similar office buildings have recently been selling at an 8.50 percent cap rate. Based solely on a comparison of cap rates, does this appear to be a good investment at the current asking price? Explain.

Based solely on its cap rate, this does not appear to be a good investment. For the price you must pay, the income it is generating annually is relatively low compared to other office properties in the market. In other words, if you purchased a different office building in the market you could obtain more than \$775,170 in annual income for your \$10 million investment.

- d) (2 points) Provide two specific reasons why the cap rate may be a misleading indicator of a property's true value as an investment. That is, what factors might cause you to change your answer in part (c) above?

Cap rates only consider first year net operating income. If the income generated by this property is expected to grow at a faster rate than other properties in the market, it could sell for a lower cap rate.

In addition, cap rates do not fully account for a property's risk. If this building is in a superior location with high-credit tenants committed to long-term leases, then this property might also command a higher than typical price (e.g., a lower cap rate).

- e) (2 points) If Trent were to buy this property at an 8.50 percent cap rate, what price would he pay?

To obtain an 8.50 percent cap rate, you would need to purchase the property at $V = \text{NOI} / r = 775,170 / 0.085 = \$9,119,647$, or just over \$9.1 million.

- 4) (10 points) Priest is analyzing an apartment investment with the following characteristics:

Potential gross income	\$15,500,000
– Vacancy allowance	<u>(775,000)</u>
Effective gross income	14,725,000
– Operating expenses	<u>5,890,000</u>
Net operating income	\$ 8,835,000

The preliminary estimate of value for this property is \$110 million.

Marvucs Mortgage is willing to provide a 5-year balloon loan at 7.50 percent on a 20-year amortization schedule with monthly payments. The minimum debt-coverage ratio (DCR) is 1.25 and the maximum loan-to-value (LTV) ratio is 75 percent.

- a) (8 points) Based on Priest’s preliminary forecast and his lender’s underwriting criteria, what is the maximum loan amount Priest can expect?

LTV-based

$$\text{Maximum Loan} = \text{Value} \times \text{max LTV} = 110,000,000 \times 0.75 = \$82,500,000.$$

DCR-based

The maximum ADS = NOI / DCR = 8,835,000 / 1.25 = \$7,068,000. Thus, the maximum monthly debt service is \$7,068,000 / 12 = \$589,000.

Enter PMT = (589,000), N = 20 × 12 = 240, P/Y = 12, I/Y = 7.50, FV = 0, and solve for PV = \$73,113,825.

Maximum loan amount

The maximum loan allowed is the minimum of these two figures, or \$73,113,825.

- b) (2 points) Based on the loan amount you calculated in part (a), what is the annual debt service on this loan? What is the resulting debt-coverage ratio?

Because the loan amount was based on the debt-coverage ratio, the annual debt service is \$7,068,000 and the debt-coverage ratio is 1.25.

Multiple Choice Questions (2 points each)

- _____ 1. Dick is purchasing a commercial office building for \$2.5 million. The appraised value of this building is \$2.6 million. Hunt Finance is willing to provide 70 percent loan-to-value financing in a 10-year balloon loan at 6.75 percent interest with amortization over 25 years and monthly payments. What will be the required the annual debt service on this loan?
- A. \$12,575.
 - B. \$145,091.**
 - C. \$12,091.
 - D. \$207,273.
 - E. \$20,094.
- _____ 2. Net operating income measures the
- A. CASH AVAILABLE TO DISTRIBUTE TO ALL OF THE INVESTORS.**
 - B. before-tax cash flow available to equity investors.
 - C. after-tax cash flow available to equity investors.
 - D. anticipated sale price of the property.
 - E. gross income generated by the investment.
- _____ 3. Morten has an office property for sale at \$2.5 million. Forecasted first-year NOI for this property is \$312,500. If other similar office properties are currently selling at an 11 percent cap rate, which of the following statements is most correct?
- A. THIS PROPERTY APPEARS TO BE A GOOD INVESTMENT BECAUSE IT IS SELLING AT AN ABOVE-MARKET CAP RATE.**
 - B. This property appears to be a poor investment because it is selling at an above-market cap rate.
 - C. This property appears to be a good investment because it is selling at a below-market cap rate.
 - D. This property appears to be a poor investment because it is selling at a below-market cap rate.
 - E. There is no information with which to evaluate this investment.
- _____ 4. A lease in which the landlord pays all the operating expenses associated with the property is known as a
- A. net lease.
 - B. GROSS LEASE.**
 - C. percentage lease.
 - D. indexed lease.
 - E. expense lease.

- _____ 5. A lease in which the rent is determined by the tenant’s sales is known as a
- A. net lease.
 - B. gross lease.
 - C. PERCENTAGE LEASE.**
 - D. indexed lease.
 - E. expense lease.

Use the following information to answer the next five questions:

Project A		Project B	
n	\$	n	\$
0	-140,000	0	-450,000
1	5,000	1	40,000
2	12,000	2	40,000
3	16,000	3	40,000
4	21,000	4	85,000
5	380,000	5	850,000

- _____ 6. What is the net present value of Project A if the investor’s required rate of return is 16 percent?
- A. \$216,000
 - B. \$294,000
 - C. \$76,000**
 - D. (\$104,923)
 - E. \$434,000
- _____ 7. What is the internal rate of return for Project A?
- A. 26.30%
 - B. 19.79%
 - C. 21.02%
 - D. 27.45%**
 - E. 16.00%
- _____ 8. What is the net present value of Project B if the investor’s required rate of return is 16 percent?
- A. \$541,476
 - B. \$605,000
 - C. \$91,476**
 - D. \$66,623
 - E. \$1,055,000

- _____ 9. What is the internal rate of return for Project B?
- A. 27.45%
 - B. 21.02%**
 - C. 19.79%
 - D. 16.00%
 - E. 26.30%
- _____ 10. If the two projects are mutually exclusive, which should be selected and why?
- A. Project A, because it has the higher NPV.
 - B. Project A, because it has the higher IRR.
 - C. PROJECT B, BECAUSE IT HAS THE HIGHER NPV.**
 - D. Project B, because it has the higher IRR.
 - E. Both should be selected, because they both have a positive NPV.

Use the following information to answer the next four questions.

Ryan is purchasing an office building for \$4.5 million. Peterson Financial is providing a \$2,700,000 mortgage to help finance this purchase. This will be a 10-year balloon mortgage amortized over 30 years with monthly payments at an interest rate of 8.25 percent.

The first payment on this mortgage will be due on May 1st.

- _____ 11. How much interest will Ryan pay during the first tax year? (Assume that the tax year corresponds with the calendar year.)
- A. \$14,110
 - B. \$246,940
 - C. \$148,164**
 - D. \$148,500
 - E. \$166,630
- _____ 12. How much interest will Ryan pay during the second tax year?
- A. \$222,750
 - B. \$220,742**
 - C. \$220,586
 - D. \$239,051
 - E. \$22,669
- _____ 13. How large will the balloon payment be at the end of the loan's term?
- A. \$265,896
 - B. \$2,497,158
 - C. \$2,380,591**
 - D. \$2,572,667
 - E. \$0

- _____ 14. If the Peterson charges three points to originate this loan and Ryan intends to hold the loan for ten years, what is the effective borrowing cost of this mortgage?
- A. 9.01%
 - B. 8.25%
 - C. 8.72%**
 - D. 7.80%
 - E. 9.19%

Use the following pro forma to answer the next seven questions.

Potential gross income	\$2,400,000
– Vacancy & collections	<u>120,000</u>
Effective gross income	2,280,000
– Operating expenses	<u>798,000</u>
Net operating income	1,482,000
– Annual debt service	<u>1,140,000</u>
Before-tax cash flow	\$ 342,000

This property has a market value of \$12.35 million.

- _____ 15. What vacancy allowance is used in this statement?
- A. 5.00%**
 - B. 95.00%
 - C. 10.00%
 - D. 7.50%
 - E. 20.00%
- _____ 16. What is this property's cap rate?
- A. 36.11%
 - B. 8.33%
 - C. 10.00%
 - D. 12.00%**
 - E. 2.77%
- _____ 17. What is the debt-coverage ratio for this property?
- A. 3.33
 - B. 1.30**
 - C. 1.18
 - D. 30.00
 - E. 76.92

_____ 18. What is the gross income multiplier for this property?

- A. 5.42
- B. 8.33
- C. 12.00
- D. 18.46
- E. 10.00

_____ 19. What is the net income multiplier for this property?

- A. 12.00
- B. 5.42
- C. 8.33
- D. 10.00
- E. 18.46

_____ 20. What is the operating expense ratio for this property?

- A. 33.25%
- B. 3.01%
- C. 76.92%
- D. 35.00%
- E. 2.86%

_____ 21. What is the breakeven ratio for this property?

- A. 35.00%
- B. 1.18%
- C. 76.92%
- D. 85.00%
- E. 2.86%

Use the following information to answer the next four questions:

Mike owns an office building with a gross building area of 130,000 square feet. This building has 120,000 square feet of gross leasable area. Space in this building rents for \$11 per square foot. All common areas are attributed to tenants on a pro rata basis.

_____ 22. What is the add-on factor for this building?

- A. 11.00
- B. 92.31
- C. 1.08
- D. 12.00
- E. 8.33

- _____ 23. What is the efficiency percentage for this building?
- A. 11.00
 - B. 92.31**
 - C. 1.08
 - D. 12.00
 - E. 8.33
- _____ 24. If Lew rents an office in this building with 1,800 square feet of usable area, how much space will he have for his exclusive use?
- A. 1,584 square feet
 - B. 1,944 square feet
 - C. 1,667 square feet
 - D. 1,800 SQUARE FEET**
 - E. 2,016 square feet
- _____ 25. How much will Lew pay annually in rent for this space?
- A. \$237,600
 - B. \$256,608
 - C. \$19,800
 - D. \$18,337
 - E. \$21,384**