

Real Estate Investment Analysis
Fall 2003

Midterm Exam 1 – Version A – Solutions

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Tu-Th 8:00-9:15

- 1) (10 points) Ron is considering the purchase of an office property with a first-year expected NOI of \$1.5 million; this figure is expected to increase by 4 percent per year indefinitely.

- a) (4 points) If Ron's required rate of return from an investment of this sort is 16 percent, how much should he be willing to pay for it?

This investment is a growing perpetuity, so its value is calculated as

$$V = NOI_1 / (r - g) = 1,500,000 / (0.16 - 0.04) = \$12,500,000.$$

- b) (3 points) What is Ron's going-in cap rate if he pays this price?

$$R = NOI_1 / V = 1,500,000 / 12,500,000 = 0.12 = 12 \text{ percent.}$$

Notice that because this investment is a growing perpetuity, the going-in cap rate can also be calculated as $R = r - g = 0.16 - 0.04 = 0.12 = 12 \text{ percent.}$

- c) (3 points) Explain what accounts for the difference between Ron's required return and the going-in cap rate in this case?

Because the investment is a growing perpetuity, the difference between the discount rate and the cap rate is simply the expected rate of growth in net operating income.

- 2) (20 points) Ginny is considering investing in Class-B office building in Denver. The building has 180,000 square feet of gross leasable area. Of this, 40,000 square feet rent for \$35 per square foot (psf), 60,000 square feet rent for \$30.00 psf, while the remaining 80,000 square feet rent for \$25.00 psf. All leases in this building are gross leases. Currently, the average vacancy rate for similar office space in Denver is 7.50%. Annual operating expenses are expected to be 60 percent of *effective* gross income. The asking price for this property is \$22.6 million.

- a) (6 points) Write out the pro forma operating statement for this property. What is its expected net operating income?

Potential gross income		
40,000 sf @ \$35.00	\$1,400,000	
60,000 sf @ \$30.00	1,800,000	
80,000 sf @ \$25.00	2,000,000	5,200,000
Less: Vacancy & collection		(390,000)
Effective gross income		4,810,000
Operating expenses		(2,886,000)
Net operating income		1,924,000

- b) (3 points) At what cap rate is the seller offering this property?

$$R = NOI / V = 1,924,000 / 22,600,000 = 0.0851 = 8.51 \text{ percent.}$$

- c) (4 points) Similar office buildings have recently been selling at an 9.50 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 \$1.924 million in annual income for your \$22.6 million investment.

- d) (4 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) (3 points) If Ginny were to buy this property at a 9.50 percent cap rate, what price would she pay?

$$\text{To obtain a 9.50 percent cap rate, you would need to purchase the property at } V = NOI / R = 1,924,000 / 0.095 = \$20,252,632, \text{ or just over } \$20.25 \text{ million.}$$

- 3) (10 points) Suppose that the recent hurricane on the East Coast had totally destroyed 13 million square feet of office space in suburban Washington, D.C.

- a) Briefly explain what impact this would have on office rents and vacancy rates in the short run.

In the short run, rents will rise and vacancy rates will fall as office users struggle to replace their old office space.

- b) Now explain what will happen to office rents and vacancies over the long run.

Because the hurricane completely destroyed this office space, this change in supply will be viewed as being permanent. As a result, new office development will occur to replace the lost space. This will tend to drive rents back down and vacancies back up, although rents may not fall to their pre-hurricane levels.

4) (18 points) You are considering two possible lease structures for a building you own. This first is a net lease with steps. The base rent for this lease is \$18.00 per square foot (psf) in the first year, with steps of \$1.00 psf each year thereafter. The second is a gross lease with base rent of \$28 psf. Operating expenses are expected to be \$7 psf in the first year and increase by \$0.50 psf each year thereafter. Either of these leases will have a five-year term.

a) (5 points) Calculate the effective rent of the net lease with steps. Assume a discount rate of 12 percent.

The first lease will have the following rents:

<u>Year</u>	<u>Rent</u>
1	\$18.00
2	\$19.00
3	\$20.00
4	\$21.00
5	\$22.00

The present value of these cash flows at a 12 percent discount rate is \$71.28. Using the TVM keys of your calculator, you can then enter P/Y = 1, N = 5, I = 12, PV = 71.28, FV = 0 ⇒ PMT = 19.77. Thus, the effective rent under this lease is \$19.77 psf.

b) (5 points) Calculate the effective rent of the gross lease using the same discount rate.

The second lease will generate the following net rent for the landlord:

<u>Year</u>	<u>Gross Rent</u>	<u>Expenses</u>	<u>Net Rent</u>
1	\$28.00	\$7.00	\$21.00
2	\$28.00	\$7.50	\$20.50
3	\$28.00	\$8.00	\$20.00
4	\$28.00	\$8.50	\$19.50
5	\$28.00	\$9.00	\$19.00

The present value of these net rents is \$72.50. Entering P/Y = 1, N = 5, I = 12, PV = 72.50, FV = 0, you can solve for the effective rent of \$20.11 psf.

c) (4 points) Which of the two leases entails the most risk for the landlord. Explain.

The gross lease entails the most risk for the landlord, because any unexpected changes in operating expenses will be his responsibility.

d) (4 points) Based on your answers to parts (a) through (c) above, which lease option would you choose? Explain your answer.

Either lease would be an acceptable answer, as long as you provide a reasonable explanation. The net lease has a lower effective rent, but it also has less risk. In contrast, the gross lease has more risk, but earns the landlord a higher expected rental stream over the life of the lease. Which you prefer depends on your tolerance for risk.

- 5) (10 points) Harry needs to lease 3,000 square feet of usable area, and is considering two different buildings. The first building has a gross leasable area of 22,000 square feet with 2,000 square feet of common areas. The landlord of this building is asking \$8.00 per square foot (psf) of rentable area. The second building has a gross leasable area of 30,000 square feet with 5,000 square feet of common areas; the asking rent for this building is \$7.50 psf of rentable area.

- a) (3 points) Calculate the load factor for the first building.

$$LF_1 = \text{Leasable Area} / \text{Usable Area} = 22,000 / 20,000 = 1.10$$

- b) (3 points) Calculate the load factor for the second building.

$$LF_2 = 30,000 / 25,000 = 1.20$$

- c) (4 points) Assuming that the space being rented is otherwise identical, which option should Harry choose? Explain your answer.

In either building, Harry will have 3,000 square feet for his exclusive use. The building with the lower rent per square foot of usable space is the one he should choose. This can be calculated by simply multiplying the base rent by each building's load factor:

$$\text{Building 1: } 8.00 \times 1.10 = \$8.80 \text{ psf usable area}$$

$$\text{Building 2: } 7.50 \times 1.20 = \$9.00 \text{ psf usable area}$$

Thus, even though building 2 has a lower stated base rent, it will be more expensive for Harry because of its higher load factor.

- 6) (12 points) Hermione is purchasing an apartment complex for \$8.2 million. The appraised value of this complex is \$8.4 million. Wizards' Life is willing to provide 60 percent loan-to-value ratio financing under a 5-year balloon loan with 5.75 percent interest with monthly payments amortized over 20 years.

- a) (3 points) What will be the annual debt service on this loan?

$$P/Y = 12, N = 20 \times 12 = 240, I = 5.75, PV = 8,200,000 \times 0.60 = 4,920,000, \\ FV = 0 \Rightarrow PMT = (34,542.51)$$

$$\text{Annual debt service is } PMT \times 12 = \$414,510$$

- b) (3 points) How large will the balloon payment be at the end of the fifth year?

$$N = 60 \Rightarrow FV = (4,159,693)$$

- c) (3 points) If the first payment on this loan is on June 1st, how much total interest will Hermione pay during the first calendar year of the loan?

$$\text{In the amortization worksheet, } P1 = 1, P2 = 7 \Rightarrow INT = \$163,913$$

- d) (3 points) How much total interest will Hermione pay during the second calendar year of the loan?

$$P1 = 8, P2 = 19 \Rightarrow INT = \$274,777$$

- 7) (14 points) Albus is considering investing in a property that has a first-year expected NOI of \$200,000; this figure is expected to increase by 5 percent per year for the indefinite future. At the end of 5 years, Albus expects to sell the property at a 12 percent terminal cap rate. Albus' required rate of return on this investment is 15 percent.

- a) (8 points) Write out the expected total cash flows from this investment over Albus' expected holding period.

<u>Year</u>	<u>Annual Cash Flow</u>	<u>Reversion</u>	<u>Total Cash Flow</u>
1	\$200,000		\$200,000
2	210,000		210,000
3	220,500		220,500
4	231,525		231,525
5	243,101	\$2,127,133	\$2,370,234
6	255,256		

- b) (3 points) How much should Albus be willing to pay for this property?

Using the above cash flows with a 15 percent discount rate, the present value of this investment is \$1,788,486. Thus, Albus should be willing to pay approximately \$1.788 million.

- c) (3 points) If he pays this price, what is Albus' going-in cap rate?

$$R = 200,000 / 1,788,486 = 0.1118 = 11.18\%$$

- 8) (6 points) Real estate space markets are typically segmented using three factors. Name these factors.

Property type, geographic location, and quality or use within a type