

**PRACTICE ONLY**

**11.431J/15.426J Real Estate Finance & Investments, Fall 2003, Practice Midterm Exam**

There are two parts to this quiz, plus an extra-credit question. The entire quiz is designed to be easily finished in 75 minutes. No open books or notes are permitted. (Some mathematical formulas are given on the last page.)

Your name: \_\_\_\_\_ ID# \_\_\_\_\_

**Part I: Multiple Choice (80% of grade, 26 equal-weighted questions).** Select the *best* alternative answer, based on what was taught in the course. Clearly indicate your selection by circling it. If it is not clear to the TA which your choice is, you will receive no credit. Read the question carefully before answering.

1. Total development costs (including sufficient profit for the developers) are \$200/SF. Cap rates in the asset market are 10%. What is the “replacement cost rent” in this market?
  - (a) \$20.00/SF.
  - (b) \$16.00/SF.
  - (c) \$12.50/SF.
  - (d) \$10.00/SF.
  
2. All of the following are fundamental causal determinants of cap rates in the property asset market, *except*:
  - (a) The opportunity cost of capital (as determined in the capital market).
  - (b) The expected growth in property rents (as determined in the space market).
  - (c) The risk perceived for the property (as determined in the space and capital market).
  - (d) The net income divided by the property price.
  
3. Which of the following is an example of “negative feedback” in the real estate system?
  - (a) Since the stock of built space cannot readily shrink, rents will fall when demand falls.
  - (b) Lenders make money by issuing loans, so they tend to keep the capital flowing to developers even during down markets.
  - (c) Real estate markets exhibit inertia, so market participants rationally extrapolate past rent trends into the future.
  - (d) Growth in space usage demand stimulates increased rents or improved prospects for future rents, which increases the present value of real estate assets, which improves the profitability of new development projects.
  
4. Which of the following is true about typical real estate investment (unlevered, at the direct property level) and inflation risk?
  - (a) Real estate investment appreciation returns do not generally keep pace with inflation in the long run, but real estate investment provides a hedge against inflation risk in that unexpected changes in inflation tend to be positively correlated with changes in property value in the short to medium term.
  - (b) Real estate investment appreciation returns generally at least equal the inflation rate in the long run, but real estate does not provide a good hedge against inflation risk in that unexpected changes in inflation do not tend to be positively correlated with changes in property value in the short to medium term.
  - (c) Real estate investment appreciation returns generally at least equal the inflation rate in the long run, and real estate investment provides a hedge against inflation risk in that unexpected changes in inflation tend to be positively correlated with changes in property value in the short to medium term.
  - (d) Real estate investment appreciation returns do not generally keep pace with inflation in the long run, and real estate does not provide a good hedge against inflation risk in that unexpected changes in inflation do not tend to be positively correlated with changes in property value in the short to medium term.
  
5. In which of the following situations would it be most appropriate to measure an investment manager's performance using the IRR rather than the time-weighted average periodic return?
  - (a) Client hires manager to place capital as soon as possible.
  - (b) Client requires a large proportion of its invested capital to be liquid at all times for withdrawal on demand.
  - (c) Client gives manager a line of capital with discretion over when to acquire and dispose of illiquid assets.
  - (d) All of the above.

6. The expected return on an investment in a property is inversely related to the price you pay for the property fundamentally because:

- (a) The future cash flows the property can generate are independent the price you pay for the property today.
- (b) The return must include a risk premium.
- (c) Inflation must be subtracted out.
- (d) The investor faces a budget constraint.
- (e) None of the above.

7. The table below shows two 10-year cash flow projections (in \$ millions, including reversion) for the same property. The upper row is the projection that will be presented by the broker trying to sell the building, the bottom row is the realistic expectations. Suppose that it would be relatively easy for any potential buyers to ascertain that the most likely current market value for the property is about \$10 million. What is the most likely amount of “disappointment” in the ex post annual rate of total return earned by an investor who buys this property believing the broker’s cash flow projection?

Year	1	2	3	4	5	6	7	8	9	10
Presented	\$1.0000	\$1.0300	\$1.0609	\$1.0927	\$1.1255	\$1.1593	\$1.1941	\$1.2299	\$1.2668	\$14.7439
Realistic	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$11.0000

- (a) 0.00%
- (b) 1.00%
- (c) 3.00%
- (d) 26.68%
- (e) Cannot be determined from the information given.

8. The table below shows the projected cash flows (including reversion) for Property A and Property B. If both properties sell at fair market value for a cap rate (initial and terminal cash yields) of 8%, then which statement below correctly describes the relative investment risk in the two properties?

Annual net cash flow projections for two properties (\$ millions)										
Year	1	2	3	4	5	6	7	8	9	10
A	\$1.0000	\$1.0300	\$1.0609	\$1.0927	\$1.1255	\$1.1593	\$1.1941	\$1.2299	\$1.2668	\$18.10
B	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$1.0000	\$13.50

- (a) Property A is more risky.
- (b) Property B is more risky.
- (c) Both properties are equally risky.
- (d) Cannot be determined based on the information given.

9. You are trying to apply a multi-year DCF analysis to evaluate an investment property with some long-term leases in it. You observe that other properties with similar lease structure and risk have been selling at cap rates around 11% (based on NOI with no capital reserve). You believe these other properties typically face capital expenditures on the order of 1% of property value per year in the long run, and that given such expenditures their net cash flows and values would reasonably be expected to grow in the long run at about 3% per year. What discount rate should you apply to your subject property in your DCF valuation?

- (a) The Treasury bond rate because of the long-term leases.
- (b) 10%
- (c) 13%
- (d) 14%
- (e) Cannot be determined from the information given.

10. Normally, one would expect what relation between the "going-in" and "going-out" cap rate?

- (a) The going-in cap rate should be higher than the going out.
- (b) The going-out cap rate should be at least as high as the going-in rate.
- (c) There is no particular relation between the two.

11. Suppose the lease on a certain space will expire at the beginning of 2001. You believe that the probability of the existing tenant renewing is 50 percent. If he renews, you will need to spend only an estimated \$5.00/SF to upgrade his space. If he does not renew, it will take \$25.00/SF to modernize the space, even then you expect 6 months of vacancy. What expected cash flow forecast should you put in year 2001 of your pro-forma for this space, if you expect triple-net market rents on new leases in 2001 to be \$20/SF?
- \$17.50/SF
  - \$15.00/SF
  - zero
  - \$10.00/SF
  - Insufficient information provided to answer the question.
12. Suppose you analyze a particular deal and it appears that for an investment of \$1,000,000 your client can obtain a positive NPV of over \$500,000. Your client is typical of the type of high tax bracket individual investors who commonly purchase and sell this type of property, and indeed typically determine equilibrium prices in the asset market in which these properties are sold. What should you do?
- Reject the deal out of hand because it costs twice as much as its NPV.
  - Phone your client right away on your cell phone and urge her to pounce on this deal before it "gets away" - the seller must have made a mistake in their offering price!
  - Buy the property with cash, take out an 80% loan-to-value ratio mortgage, and laugh all the way to the bank with \$200,000 of arbitrage profits!
  - Sharpen your pencil, double-check your assumptions and analysis, try to find what is unique about your client.
  - Cannot be answered from the information given.
13. Which statement is true ex ante?
- Leverage normally increases the owner's income return (cash yield) if you pay market value for the property.
  - Leverage normally increases the owner's income return (cash yield) if you pay more than market value for the property.
  - Leverage normally increases the owner's total return (including appreciation) if you pay market value for the property.
  - Leverage normally increases the owner's total return (including appreciation) if you pay more than market value for the property.
14. Assuming riskless debt, if the return risk is  $\pm 15\%$  with a 40% Loan/Value Ratio, then with a 80% Loan/Value Ratio the return risk is:
- $\pm 7.5\%$
  - $\pm 15\%$
  - $\pm 30\%$
  - $\pm 45\%$
  - Cannot be determined from the information given.
15. All of the following are true about the "property before-tax (PBT) shortcut", *except*:
- The PBT shortcut is useful not only because it simplifies the investment analysis but because it avoids the necessity of estimating after-tax parameters that may be difficult to observe without error.
  - The shortcut is made possible by the existence of a reasonably well functioning market for the type of investment asset in question.
  - The shortcut works for estimating market value always, and for estimating investment value for investors who are typical of the marginal investors in the relevant asset market.
  - At the PBT level the investor's own subjective opportunity cost of capital can be used as the discount rate in order to estimate that investor's "investment value" (IV) for the property.
16. After-tax cash flow will exceed before-tax cash flow whenever:
- Taxable income is negative.
  - Capital expenditures exceed net operating income.
  - The building is fully depreciated.
  - Interest and depreciation expenses are less than net operating income.

17. A non-residential commercial property which cost \$500,000 is considered to have 30 percent of its total value attributable to land. The annual depreciation expense chargeable against taxable income is:

- (a) \$18,182
- (b) \$15,873
- (c) \$13,967
- (d) \$8,974

18. The difference between the net operating income (NOI) and the equity before-tax cash flow (EBTCF) is:

- (a) Property Tax Expense and capital expenditures.
- (b) The debt service and capital expenditures.
- (c) Property taxes and income taxes.
- (d) Interest expense and depreciation expense.

19. The NOI is \$40,000; there are \$5,000 in tenant improvement expenditures paid for by the landlord; there is a \$200,000 interest-only loan at 8 percent annual interest; the depreciable cost basis of this residential property is \$300,000; the owner's tax bracket is 33 percent. What is the Equity After-Tax Cash Flow (EATCF)?

- (a) \$14,680
- (b) \$27,800
- (c) \$30,680
- (d) \$35,000
- (e) Cannot be determined from the information given.

20. A seller has offered you a \$1,000,000 interest-only 5 year loan at 6% (annual payments), when market interest rates on such loans are 8%. Basing your decision on market values, how much more should you be willing to pay for the property than you otherwise think it is worth, due to the financing offer?

- (a) Zero, by definition.
- (b) \$26,497
- (c) \$79,854
- (d) \$98,412

21. Again considering the same seller loan offer as in the previous question, suppose you face a 35% marginal income tax rate and so does the marginal investor in the debt market. Now basing your decision on investment value, how much more should you be willing to pay for the property than you otherwise think it is worth, due to the financing offer?

- (a) Zero, by definition.
- (b) \$26,497
- (c) \$55,973
- (d) \$86,602

22. Consider a 20-year (monthly-payment), 8%, \$80,000 mortgage with 2 points prepaid interest up front. What is the "effective interest rate" or yield over the borrower's expected holding period if the borrower expects to hold the loan for 12 years?

- (a) 8.00%
- (b) 8.25%
- (c) 8.31%
- (d) 8.56%

23. In comparing an adjustable rate mortgage (ARM) with a fixed rate mortgage (FRM):

- (a) Both the borrower and lender bear more interest rate risk with the ARM than with the FRM.
- (b) Both the borrower and the lender bear less interest rate risk with the ARM than with the FRM.
- (c) The ARM borrower bears more interest rate risk, but the ARM lender bears less interest rate risk, than with the FRM.
- (d) The ARM borrower bears less interest rate risk, but the ARM lender bears more interest rate risk, than with the FRM.

24. Consider an 8.5% loan amortizing at a 25-year rate with monthly payments. What is the maximum amount that can be loaned on a property whose net operating income (NOI) is \$500,000 per year, if the underwriting criteria specify a debt service coverage ratio (DCR) no less than 125%?

- (a) \$2,789,406
- (b) \$3,409,091
- (c) \$3,844,614
- (d) \$4,000,000
- (e) \$4,139,619

25. For the same property as above, suppose the underwriting criteria is a maximum loan/value ratio (LTV) of 75%, and we estimate property value by direct capitalization using a rate of 11% on the stated NOI. By this criterion what is the maximum loan amount?

- (a) \$2,789,406
- (b) \$3,409,091
- (c) \$3,844,614
- (d) \$4,000,000
- (e) \$4,139,619

**Part II (20%): 1 of 2 questions. Answer either one of the questions below, or *diversify your portfolio* by answering both. If you answer both, we will grade both and assign each question half of the 20% for this part. If you answer only one, that one you answer will get the full 20%. Please be sure it is clear to us which question(s) you want to be graded. If the TA cannot figure it out on her own, she will grade both.**

1. Suppose you own a vacant but developable land parcel on the outskirts of the metropolitan area. This land produces no income but owes 2% of its value per year in property taxes. Meanwhile, typical income properties are yielding 9% (that is, they have a current cash yield, or “cap rate”, of 9%). If inflation is expected to be around 3% per year, and you expect your land will appreciate at 10% per year, what should you do with this land parcel? (Be specific and please explain *why* you should do what you say.)

2. (a) Fully explain and clarify the following statement: “There are two types of tax shields available to investors in property equity: depreciation tax shields (DTS) and interest tax shields (ITS), but only one of these types of tax shields generally adds to the investment value of the investment no matter what the investor’s marginal tax rate.” (b) As part of your answer, quantify the NPV to two different borrowers, from an after-tax investment value perspective, of a perpetual loan of \$1,000,000 at 6% interest when the market yield on corporate bonds is 6% and on otherwise identical municipal bonds is 4%, and Borrower A faces a marginal tax rate of 30% while Borrower B faces a marginal tax rate of 35%. (c) Also, compare the NPV to Borrower B to the PV of the that borrower’s interest tax shields (the PV of the borrower’s tax deductions associated with the loan).

**Part III: Extra-credit question.** Earn up to 5% extra credit. It can help you but not hurt you. And this time, *no diversification*. You must pick **only one** of the questions below to answer. If the TA cannot tell which one you wanted, he will simply grade the first. (Aside: Do you get how valuable diversification is if you are risk-averse?)

1. Consider the following fully-amortizing **5-year** ARM (contract interest rate can change once every **60** months) with **15**-year maturity, monthly payments. The ARM has initial interest rate 6.5% with 2 points, caps are 2% per jump, 5% lifetime, margin is 300 basis points, index is Treasury Bonds that are currently yielding 6.0%. The loan amount is \$100,000. Under the “straight line” assumption about future interest rates (i.e., assuming the market rate on the index remains constant), what is the yield to maturity? (Show your work if you want to possibly get partial credit.)

2. (5 points) Consider a \$4,000,000, 7%, 25-year mortgage with monthly payments and a 7-year maturity with balloon. If the market yield is 7.5% (BEY), how many disbursement discount points must the lender charge to avoid doing a negative NPV deal from a market value perspective?

**Formulas that may (or may not) be useful in this exam . . .**

$$a + da + d^2a + \dots + d^{n-1}a = a(1-d^n)/(1-d).$$

$$PMT/(1+r) + PMT/(1+r)^2 + \dots + PMT/(1+r)^n = (PMT/r)[1 - 1/(1+r)^n].$$

$$CF + CF/(1+r) + CF/(1+r)^2 + \dots + CF/(1+r)^{n-1} = (1+r)(CF/r)[1 - 1/(1+r)^n].$$

$$CF/(1+r) + (1+g)CF/(1+r)^2 + (1+g)^2CF/(1+r)^3 + \dots \text{ (forever)} = CF/(r-g).$$

$$EAY = (1+CEY/2)^2 - 1; MEY = ((1+EAY)^{1/12} - 1) * 12.$$

$$PMT = PV * (i/m) / (1 - 1/(1 + i/m)^N); i = \text{IntRate}/\text{Yr}, m = \text{Pmts}/\text{Yr}.$$