Problem Set 7 (Voluntary)
For Discussion in Special Review Session.
(This problem set is designed to help you review for the final exam. Note that many of these questions have close parallels in the study questions at the ends of Chapters 14, 30, 17 & 18, some of which are answered in the back of the book.)

1. A certain real estate opportunity fund offers institutional investors the opportunity to make equity investments in real estate development projects. The equity capital invested in the fund is effectively used primarily to acquire land that is ready and ripe for construction. The construction costs themselves (i.e., exclusive of land acquisition) are usually financed through construction loans. When the projects are completed, the properties are typically sold, at the then-current market value, into a separate, conventional ("core" type) commingled investment fund run by the parent firm of the opportunity fund. When the completed properties are sold, the related construction loan is paid off and the net proceeds from the development project are paid out to the opportunity fund investors. The average duration of the construction projects undertaken by the opportunity fund is one year. Suppose the market value of the types of properties being built by this opportunity fund experiences a volatility (standard deviation of the percentage change in property value) of 10% per year (i.e., considerably less than the average volatility of the stock market, which exceeds 15% per year). And suppose that the average up-front equity investment in the construction projects undertaken by the fund (primarily land acquisition cost) is 20% of the completed project value a year later. Under the assumption that the construction loans are effectively riskless (no volatility in their value over time), what would you expect to be the average annual volatility of the equity investment in this opportunity fund?

2. Use the following information and the APV decision rule, to answer the following questions. A seller has offered you a $1,500,000 interest only 7 year loan at 6% (annual payments), when market interest rates on such loans are 7%. You face a 35% marginal income tax rate.
a) 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?
b) Answer the same question only now basing your answer on investment value rather than market value.

3. Consider a commercial (non-residential) property that costs $1 Million with an initial before-tax yield of 8% (based on NOI), and an expected growth rate of 1% per year (in income and value). Ignoring capital improvements and selling expenses, develop a 10-year proforma for before-tax and after-tax property and equity cash flows. Assume a 40% income tax rate on ordinary income and 20% on capital gains, and financing of 70% of the property price with a 9% interest-only loan, and that land is worth 25% of the property value. Use the proforma to determine: (a)the ex ante before-tax IRR of the unlevered property investment; (b)the after-tax IRR of the unlevered property investment; (c) Compute the before-tax ex ante IRR of the levered investment in this property; and (d) the after-tax ex ante IRR of the levered equity in this property; and (e) the ratio of the AT/BT in the levered IRR, and note the difference between this

ratio and the unlevered equivalent: (f) Do you think this is an argument for debt financing for this property investment for this investor? Why not?

[Hint: Note that this problem here is simplified from 14.11, leaving out the questions about PV(DTS), which you can skip. I strongly recommend that you use Excel or your favorite computer spreadsheet to do this problem. It will be much faster that way, and good practice for your computer spreadsheet skills.]

4. Calculate the effective rent of the following leases from the landlord's perspective assuming the tenant faces an 8% borrowing rate:

        (a) 7-year net lease, $10/SF, 1 year free rent up front.

        (b) 7-year net lease, starting at $8.50/SF, with step-ups of $0.50 each year.

        (c) 7-year net lease, starting at $9/SF, CPI-adjustments every year equal to 75% of the change in the CPI. CPI change (inflation) is expected to be 3% per year.

        (d) 7-year gross lease, $15/SF, expenses expected to be $7/SF initially, growing at 2% per year.

        (e) 7-year gross lease, $15/SF, expense stop at $7/SF, expenses expected to grow at 2% per year.

        (f) 10-year net lease, $10/SF, Tenant improvements paid by landlord $13/SF at beginning.

5. Assuming the same borrowing rate, what is the effective rent from the *tenant's perspective* for the leases in (d) and (e) in the above problem?

6. Use the methodology described in Appendix A of Chapter 30 to quantify the impact on the effective rent of the lease in question 5(a) above, if the lease also includes a renewal option for the tenant, giving the tenant the right (but not obligation) to renew the lease after 7 years at $11.00/SF. Assume that the present subjective probability regarding the market effective rents for new 5-year leases, 5 years from now, is that there is a 50 percent chance that the market rent will be $12/SF, and a 50 percent chance that it will be $10/SF. Suppose that the riskfree interest rate is projected to remain at the current 6% rate, the intra-lease risk premium is expected to remain at 2%, and the option is perceived as having three times the risk of the signed lease.

7. You are representing a landlord in a lease negotiation with a prospective new tenant who would occupy a vacant space in a newly completed building. You have proposed a 10-year lease at an effective rent of $10.00/SF. The tenant is interested, but has indicated they might prefer a shorter-term lease. You believe the rental market is currently "in balance" and will remain so over the foreseeable future, and in the stable market where this property is located nominal growth in location value will be just counter-balanced by real depreciation of the structural component of your property (i.e., future spot rents will remain about the same as they are today in nominal terms). Assuming a tenant borrowing rate of 8% and an inter-lease discount rate of 12%, what effective rent on a 5-year lease would be equally desirable for your client as the $10/SF rent you proposed on the 10-year lease? [Hint: Use the procedure described in Appendix B of Chapter 30.]

8. Explain how rental market risk would typically cause the landlord to prefer longer-term leases and the tenant to prefer shorter-term leases holding effective rent constant. [Hint: consider inter-

lease or rental market risk and how this affects building value from the landlord's perspective and how it affects the value of the tenant's firm assuming value-additivity as described in Brealey-Myers.]

9. What factors would tend to make <u>both</u> landlords and tenants prefer shorter-term leases, ceteris paribus?

10. What factors would tend to make <u>both</u> landlords and tenants prefer longer-term leases, ceteris paribus?

11. Consider a $3,000,000, 6%, 30-year mortgage with monthly payments. Compute the first three payments and the loan balance after the third payment for each of the following loan types: (a) Interest-only, (b) CAM, (c) CPM.

12. Describe a real estate and economic circumstance in which each of the above three types of loans would be most appropriate.

13. Consider a $3,000,000, 6%, 30-year GPM with monthly payments and two annual step-ups of 10% each (one after the first 12 payments, and the other after the 24th payment). (a) What is the initial monthly payment on this loan (prior to the first step-up)? (b) What is the final monthly payment level (after the second step-up)?

14. Consider an $3,000,000, 30-year ARM with monthly payments and annual interest adjustments. The initial interest rate is 4%. The index for the loan is 1-year LIBOR, currently yielding 3.0%. The loan has a margin of 200 basis points. (a) Is the loan's initial interest rate a "teaser rate"? How do you know? (b) If 1-year LIBOR remains at 3%, what will be the applicable interest rate for this mortgage after the first year? (c) What are the initial monthly payments on this loan? (d) Assuming LIBOR remains at 3%, what will be the monthly payments after the first year? (e) Under that assumption (and assuming no discount points), what is the forecasted yield-to-maturity on this loan at the time it is issued, assuming it has no discount points.

15. Describe the trade-off and pros and cons of the above ARM versus a 30-year FRM that charges 6% interest, supposing: (a) The bond market yield curve currently has its "normal" slightly upward-sloping shape; (b) The bond market yield curve currently is "steeply" upward-sloping.

16. Consider a $3,000,000, 6%, CPM with monthly payments. What is the regular monthly payment and the balloon payment amounts in each of the following cases: (a) Fully-amortizing, 25-year loan; (b) 25-year amortization, 10-year balloon; (c) 15-year amortization, 10-year balloon. (d) What is the major disadvantage, and advantage, of the 15-year amortization-rate 10-year loan in (c) as compared to the 25-year amortization-rate 10-year loan in (b)?

17. Consider a 6%, 30-year mortgage with monthly payments. What is the YTM of this loan under the following circumstances: (a) No points, fully-amortizing; (b) Two points of disbursement discount, fully amortizing; (c) Two points of disbursement discount, 8-year

maturity with balloon. [Note: You do not need to know the loan amount to answer these questions.]

18. Consider a 6%, 30-year mortgage with monthly payments, and expected realistic prepayment horizon of 8 years. What is the contractual yield (effective interest rate) at issuance over the expected life of the loan under the following circumstances: (a) No points or penalties; (b) One point of disbursement discount; (c) Two points of disbursement discount; (d) Two points of disbursement discount plus one point of prepayment penalty.

19. Consider a $3,000,000, 6%, 30-year mortgage with monthly payments and an 8-year maturity with balloon. (a) How much is this loan worth at issuance if the market YTM for such loans is 5.5% BEY? (b) If instead the market yield is 6.25% (BEY), how many disbursement discount points must the lender charge to avoid doing a negative NPV deal? [Note: Answer these questions on the basis of "market value". i.e., before-tax (or after-tax only for marginal investors in the debt market).]

20. A lender wants to achieve a 5.5% yield (MEY now, not BEY) on a 30-year amortization, monthly-payment loan with an 8-year maturity with balloon. How many disbursement discount points must the lender charge under the following circumstances: (a) Contract interest rate is 5.25%; (b) Contract interest rate is 5.0%.

21. (a) As a borrower, which of the following two 25-year, monthly-payment loans would you choose if you had a 15-year expected prepayment horizon: 6% interest rate with 4 points, versus 6.75% interest with one-half point? (b) Suppose your prepayment horizon was 5 years? [Note: You do not need to know the loan amount, and, yes, the numerical part of the answers to this problem in the book are wrong! ☹.]

22. Three years ago you obtained a 6%, $3,000,000, monthly-payment mortgage with 30-year amortization and an 8-year maturity. (The loan thus matures 5 years from now, with a balloon payment.) This loan has a prepayment clause, but stipulates a 3 point prepayment penalty on the outstanding balance. Now suppose interest rates have risen, so that similar loans today would carry a 8% interest rate. Suppose further that the old loan has no due-on-sale clause, and you want to sell the property that is collateral on the loan. A buyer is willing to pay $4,000,000 for the property, but has only $1,000,000 available for equity, and claims he does not feel comfortable with the payments on a $3,000,000 mortgage at 8%, though he would do the deal at 7.5% with a 30-year amortization rate and a 5-year balloon. (a) What would be your yield on your investment in a "wrap-around" loan meeting the buyer's specifications? [Note: In a wrap-around loan, the 1st-mortgage borrower/property seller provides a 2nd-mortgage to the property purchaser (the wrap loan borrower) such that the payments on the wrap loan (the 2nd mortgage) completely cover the debt service and balloon obligations on the 1st mortgage.] (b) Why are you able to get an expected return on this investment so much in excess of the current 1st-mortgage market rate of 8%? [Hint: There are two reasons.]

23. A commercial mortgage is written for $3,000,000 at 6% with 30-year amortization and a 8-year balloon payment. A yield-maintenance prepayment penalty is included as follows. If the borrower pays the loan off early, he must pay the lender an amount such that if the lender

reinvests the proceeds (including the prepayment penalty) in US Government Treasury Bonds maturing on the same date as the original maturity of the mortgage, the lender will receive the same 6% mortgage-equivalent YTM on the loan's outstanding balance as he would have received in the mortgage over the remaining time until the loan's original maturity. Now suppose the borrower prepays the loan after 6 years. Suppose that on that date 3-year Government Bonds are yielding 4% (bond-equivalent yield). How much prepayment penalty must the borrower pay (computed in dollars and in "points", that is, percent of OLB)? [Compute your answer based on coupon-equivalent yield, converting the mortgage MEY to its equivalent BEY.]

24. Suppose 10-yr Treasury Bond yields in the bond market are 6.00% CEY, and the mortgage market requires a contract yield risk premium of 200 basis points (CEY). If a property has a net operating income (NOI) of $1,000,000, and the underwriting criteria require a debt coverage ratio (DCR) of at least 120%, then what is the maximum loan that can be offered assuming a 25-year amortization rate and montlhy payments on the mortgage?

25. Using the discounted cash flow (DCF) valuation method, what is the maximum loan that can be made on a property with the following annual net before-tax cash flow, assuming an 10.5% discount rate and underwriting criteria which specify a maximum loan/value ratio of 75%? Cash flows: $1 Million inYr.1, 1.1 Million in Yr.2 through 4, 1.5 Million in Yr.5 through 9, and $12 Million in Yr 10 including reversion?