

## Topic 18: Written Problem Set

*A separate file has these problems accompanied by detailed solutions. Handwriting need not be the neatest, and you do not have to provide comments, but the computational steps should be fairly complete -- you are earning credit for working the problems carefully so that you will be better prepared for the exam. Points will be taken off for cutting corners. In a few spots you can abbreviate on some of the computational steps (like using  $+ \dots +$  or the summation sign when many similar terms are added together), but we want you to show that you understand the relationships – such as that the PV of an annuity factor is just the sum of the so-called PV of \$1 factors for the same discount rate and same number of time periods. Our FIL 260 written homework assignments generally are not financial calculator exercises, although it is fine to solve for IRR with the calculator's function keys if you also show the equation the calculator's trial-and-error computations are based on.*

*Please submit a scanned or photographed copy of your carefully hand-written solutions to these problems. (If you take photographs of individual pages with your phone or other device, please paste all of the pictures into a single Word file in the correct order before submitting. DO NOT submit multiple individual photographs; that kind of submission can be very difficult for the instructor to grade.) Upload your submission to Canvas if you can; attach it to an e-mail to the instructor if you can not. Due date and time are shown with the assignment information on Canvas.*

1. A real estate investor buys an income-producing property for \$700,000 (\$490,000 in debt and \$210,000 in equity). The investment is expected to generate after-tax cash flows (ATCF's) to the equity position for six years as follows: \$27,000 in year 1; \$29,000 in year 2; \$31,000 in year 3; \$33,000 in year 4; \$35,000 in year 5; and \$37,000 in year 6. At the end of year 6 the equity investor expects to sell the property for \$750,000. After paying off the remaining loan balance and paying all transaction-related fees (including all applicable taxes), the equity investor expects to net \$190,000 from the property sale (the after-tax equity reversion, or ATER).
  - a. What is the net present value (NPV) of this investment if the equity investor requires a 9% annual rate of return?
  - b. Set up the equation that the equity investor would use in computing her internal rate of return (IRR). [It is not necessary to solve, but you should at least set up the equation.]
  
2. A real estate investor buys an income-producing property for \$1,250,000 (\$850,000 in debt and \$400,000 in equity). The investment is expected to generate after-tax cash flows (ATCF's) to the equity position of \$44,000 per year for ten years, and at the end of year 10 the equity investor expects to sell the property for \$1,400,000. After paying off the remaining loan balance and paying all transaction-related fees (including all applicable taxes), the equity investor expects to net \$450,000 from the property sale (the after-tax equity reversion, or ATER).
  - a. What is the net present value (NPV) of this investment if the equity investor requires a 12% average annual rate of return? *Set it up first with year 1 – 10's series of repeated \$44,000 cash flows shown individually, and then set it up using the PV of annuity factor, which lets us use the distributive property to group repeated equal payments into one computation. (You can compute the answer with the briefer annuity approach, but at least show how to set it up with year-by-year dollar amounts.).*
  - b. Set up the equation that the equity investor would use in computing her internal rate of return (IRR).
  
3. A land speculator buys some acreage for \$120,000, all of which is his own equity money. He plans to sell in four years, at which point he predicts the land will be worth \$195,000. During the four holding years he expects to lease part of the land to a farmer and collect just enough in rent to cover property taxes and other annual holding costs for the tract, such that the cash flow during each of years 1 – 4 is expected to be \$0 and the only net cash flows to consider are year 0's purchase outlay and the sales price at the end of year 4. The annual cost of capital or hurdle rate the buyer assigns to a project of this type is 8%.
  - a. What are this investment's net present value and internal rate of return?
  - b. What would the NPV and IRR be if instead the cost of capital/investment hurdle rate were 15% per year?
  
4. The following scenarios relate to a \$7,000,000 investment property. Compute the owner's annual return on equity (ROE) in each case, and indicate in parts b and d whether positive or negative financial leverage is present.
  - a. The property generates net rents minus operating costs minus income taxes of \$830,000 per year, and the entire purchase was financed with equity (there is no debt financing):

- b. The property generates net rents minus operating costs minus income taxes of \$830,000 per year, and 75 percent of the purchase price was financed with an interest-only loan that carries a 9.5% after-tax annual interest cost:
- c. The property generates net rents minus operating costs minus income taxes of \$565,000 per year, and the entire purchase was financed with equity (there is no debt financing):
- d. The property generates net rents minus operating costs minus income taxes of \$565,000 per year, and 75 percent of the purchase price was financed with an interest-only loan that carries a 9.5% after-tax annual interest cost: