

# Fall Final Financial Functions Practice "B" Annotated Answers

REMEMBER: Ignore negatives and round answers to the nearest dollar; will explain why in subsequent weeks.

If you understand these problems, you'll do great on the midterm.

#1 Output = FV "how much will have been saved at retirement" **NOTICE: PER year = PMT**  
**(\$738,974)**  
Inputs: n = 45 (70-25); PMT = \$3,000 ("per year"); rate = 6.5% PV = 0 ("no savings or debt")

#2A BOTH Output = PV "Present Value of Option One"  
OPTION ONE Inputs: PMT = \$35,000 ("per year"); n = 20; rate = 5% **NOTICE: PER year = PMT**  
**(\$436,177)**

#2B OPTION TWO Inputs: FV = \$500,000 "lump sum in 6 years"; n = 6; rate = 5%  
**(\$373,108)**

#2C **OPTION ONE HAS A HIGHER PRESENT VALUE & IS THE BEST OPTION.**

#3 Output = PMT "monthly payment" **REMEMBER: FOR ALL LOANS, DO MONTHLY**  
**(\$4,124)**  
Inputs: PV = \$550,000 (loan amount); rate = 4.2%/12; n = 15\*12

#4 Output = PMT ". . . must be saved each year . . ." **NOTICE: EACH YEAR = PMT**  
**(\$9,728)**  
Inputs: FV = \$1,400,000 ("savings goal"); n = 35 (65 - 30); PV = \$8,000 ("credit card debt");  
rate = 7.5% **NOTICE: "Debt" input as positive \$8,000.**

#5 Output = PV "how much should an investor pay" **NOTE: INVESTMENT VALUES = PV**  
**(\$46,122)**  
Inputs: FV = \$40,000 (face value); PMT = \$3,500 per year; rate = 7%; n = 14 years.

#6 Output = PV "how much should an investor pay" **NOTE: INVESTMENT VALUES = PV**  
**(\$16,190)**  
Inputs: FV = \$50,000 (face value); rate = 5.8%; n = 20 years

#7 Output = PV "how much can you borrow", loan amount

**(\$795,050)**

Inputs: PMT = \$150,000 per year \* 30% / 12;  
rate = 3.9%/12; n = 30\*12

**NOTE: \*30% allocates annual income to annual payment  
Dividing by 12 converts annual payment to monthly payment**

#8 Output = PMT ("must be saved each year")

**(\$7,061)**

Inputs: FV = \$1,300,000 ("savings goal"); rate = 5.5%; n = 45 (70-25)

**NOTICE: EACH YEAR = PMT**

#9 Output = FV "will have been saved at retirement"

**(\$1,032,498)**

Inputs: PMT = \$4,500 ("per year"); PV = \$15,000 ("student loan"); rate = 6.7%; n = 40 (65 - 25)

**Note: Savings is an asset, input as positive value**

#10 **One Bedroom Unit Monthly Rent =** \$750 **X 10 units X 12 months (1st Year Income For One Bedroom Units)**  
**Two Bedroom Unit Monthly Rent =** \$1,250 **X 6 units X 12 months (1st Year Income For Two Bedroom Units)**

	Year 1	Year 2	Year 3	Year 4	
<b>Annual Gross Income</b>					
<b>One Bedroom Units</b>	\$90,000	\$96,300	\$103,041	<b>\$110,254</b>	Increase each year gross income 7% by multiplying by 1.07
<b>Two Bedroom Units</b>	\$90,000	\$96,300	\$103,041	<b>\$110,254</b>	Increase each year gross income 7% by multiplying by 1.07
<b>Total Annual Gross Income</b>	\$180,000	\$192,600	\$206,082	<b>\$220,508</b>	Add Gross Income Figures for One & Two Bedroom Units
<b>Vacancy &amp; Collection Loss (4%)</b>	\$7,200	\$7,704	\$8,243	<b>\$8,820</b>	Multiply each year annual gross income by 4%
<b>Annual Effective Gross Income</b>	\$172,800	\$184,896	\$197,839	<b>\$211,687</b>	Subtract vacancy figure from annual gross income for each year
<b>Annual Expenses</b>	\$45,000	\$46,350	\$47,741	<b>\$49,173</b>	Increase each year expenses 3% by multiplying by 1.03
<b>Annual Net Income</b>	\$127,800	\$138,546	\$150,098	<b>\$162,515</b>	Subtract expenses from effective gross income for each year

#11 **Use the four net annual income figures for years one, two, three and four.**

	Year One	Year Two	Year Three	Year Four	
	\$127,800	\$138,546	\$150,098	\$162,515	
<b>Add Property Sale Price To Year 4</b>				<b>\$1,700,000</b>	4th year annual net income of \$196,385 + \$1,700,000 proceeds of sale = \$1,896,385
Output = NPV ("net present value")	\$127,800	\$138,546	\$150,098	\$1,862,515	
<b>\$1,669,215</b>					Rate = 9%

#12 **Note: Before the clock starts (time 0), you buy the property for \$1,850,000. Input the purchase price as a negative number, \$ going out of your pocket. Use the same figures as used in #11 and put a year zero in front with the purchase price input as a negative.**

	Year Zero	Year One	Year Two	Year Three	Year Four	
	-\$1,850,000	\$127,800	\$138,546	\$150,098	\$1,862,515	<b>BE SURE TO ROUND % ANSWER TO NEAREST TENTH NO input required for "Guess" in function box.</b>
Output = IRR ("internal rate of return")						<b>5.9%</b>

#BONUS One Bedroom Unit Monthly Rent = \$850 X 10 units X 12 months (1st Year Income For One Bedroom Units)  
 Two Bedroom Unit Monthly Rent = \$1,450 X 6 units X 12 months (1st Year Income For Two Bedroom Units)

	Year 1	Year 2	Year 3	Year 4	
<b>Annual Gross Income</b>					
One Bedroom Units	\$102,000	\$109,140	\$116,780	<b>\$124,954</b>	Increase each year gross income 7% by multiplying by 1.07
Two Bedroom Units	\$104,400	\$111,708	\$119,528	<b>\$127,894</b>	Increase each year gross income 7% by multiplying by 1.07
Total Annual Gross Income	\$206,400	\$220,848	\$236,307	<b>\$252,849</b>	Add Gross Income Figures for One & Two Bedroom Units
Vacancy & Collection Loss (4%)	\$8,256	\$8,834	\$9,452	<b>\$10,114</b>	Multiply each year annual gross income by 5%
Annual Effective Gross Income	\$198,144	\$212,014	\$226,855	<b>\$242,735</b>	Subtract vacancy figure from annual gross income for each year
Annual Expenses	\$45,000	\$46,350	\$47,741	<b>\$49,173</b>	Increase each year expenses 4% by multiplying by 1.04
Annual Net Income	\$153,144	\$165,664	\$179,115	<b>\$193,562</b>	Subtract expenses from effective gross income for each year

Use the four net annual income figures for years one, two, three and four.

	Year One	Year Two	Year Three	Year Four
	\$153,144	\$165,664	\$179,115	\$193,562
Add Property Sale Price To Year 4				<b>\$1,700,000</b>
	\$153,144	\$165,664	\$179,115	\$1,893,562

NET PRESENT VALUE = **\$1,759,692**

Determine the property values ("outcome values") for each of the six possible combinations of rent. Output = NPV ("net present value") Rate = 9%  
 Calculations use Net Present Value function (see #11 above). Find the probability of each outcome using the multiplication rule.

Outcome Value Assuming:		*	P (X,Y)	=	PRODUCT OF PROBABILITY * OUTCOME
One Bedroom = \$750 & Two Bedroom = \$1,250	<b>\$1,669,215</b>	*	7.5%	=	<b>\$125,191</b>
One Bedroom = \$800 & Two Bedroom = \$1,250	<b>\$1,689,778</b>	*	12.0%	=	<b>\$202,773</b>
One Bedroom = \$850 & Two Bedroom = \$1,250	<b>\$1,710,341</b>	*	10.5%	=	<b>\$179,586</b>
One Bedroom = \$750 & Two Bedroom = \$1,450	<b>\$1,718,566</b>	*	17.5%	=	<b>\$300,749</b>
One Bedroom = \$800 & Two Bedroom = \$1,450	<b>\$1,739,129</b>	*	28.0%	=	<b>\$486,956</b>
One Bedroom = \$850 & Two Bedroom = \$1,450	<b>\$1,759,692</b>	*	24.5%	=	<b>\$431,124.54</b>

ADD UP THE PRODUCTS TO FIND THE "EXPECTED VALUE FOR THIS PROPERTY"

**\$1,726,380**

100.0%