

Math 111 Finance Worksheet B

1. **Future Value Annuity:** How long will it take Dot Snice to accumulate \$1,000,000 if she invests \$3,000 per year at an annual interest rate of 8%? Assume interest is compounded annually.

<p>* N= 43.14          I%= 8          PV= 0          PMT= 3000          FV= 1000000          P/Y= 1          C/Y= 1          PMT: <u>END</u> BEGIN</p>	$A = PMT \left[ \frac{(1 + r/n)^n - 1}{r/n} \right]$ $1000000 = 3000 \left[ \frac{(1 + .08/1)^n - 1}{.08/1} \right]$	<p><b>Explorations:</b></p> <ul style="list-style-type: none"> <li>How long will it take to accumulate \$1 million with different annual investments?</li> <li>How long will it take \$3000 to accumulate \$1 million with different interest rates?</li> </ul>
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PMT	t (n = 1; r = .08; A = 1000000)
600	63.7
1200	54
3000	43
7200	32
12000	26
15000	23

r	t (n = 1; PMT = 3000; A = 1000000)
.01	147
.05	59
.08	43
.09	40
.13	31
.20	23

2. Many employers offer a 401K or 403B plan that allows employees to invest for retirement. The beauty of the plan is that employees who invest \$15,000 in a year, will pay federal taxes on \$15,000 less in income – a tremendous tax savings. If we assume that the tax saved equals the rate of return on an investment, calculate the return on investment for the two employees below.

Salary	\$50,000	\$50,000
Investment in TSA	\$15,000	\$0
Taxable Income	\$50,000 - \$15,000 = \$35,000	\$50,000
Fed Tax Paid	\$5,308	\$9,058
State Tax Paid (4%)	(.04)(\$35000) = \$1,400	(.04)(\$50000) = \$2,000
Tax Savings:	(\$9,058 + \$2,000) - (\$5,308 + \$1,400) = \$4,350	
Rate of return:	\$4,350/\$15,000 = 29%	

Repeat the above calculations to determine the tax savings of a second employee.

Salary	\$80,000	\$80,000
Investment in TSA	\$15,000	\$0
Taxable Income	65000	80000
Fed Tax Paid	\$12,902	\$17,102
State Tax Paid (4%)	2600	3200
Tax Savings:	20302 - 15502 = 4800	
Rate of return:	4800/15000 = 0.32	