Math 111 **Finance Worksheet A**

APPS Finance TVM Solver

While cursor is blinking on the value to be calculated, enter ALPHA ENTER (SOLVE).

TVM Solver	
N=	**N** = number of payment periods
I%=	**I%** = annual interest rate (do not convert to a decimal; if APR = 9%, the I% = 9)
PV=	**PV** = present value (amount of the loan) or beginning lump sum investment
PMT=	**PMT** = per period payment amount
FV=	**FV** = future value
P/Y=	**P/Y** = number of payments per year
C/Y=	**C/Y** = number of compounding periods per year
PMT: END BEGIN	**PMT: END BEGIN** (When the regular payments are made: at the BEGINning of the period or at the END)

1. **Lump Sum Investment**: When Bud Uronner was born, his grandfather made an initial deposit of $3,000 into an account for his college education. Assuming an interest rate of 6% compounded quarterly, how much will the account be worth in 18 years?

N= 18·4 = 72
I%= 6
PV= 3000
PMT= 0
* **FV= 8763.47**
P/Y= 4
C/Y= 4
PMT: [END] BEGIN

$$A = P\left(1+\frac{r}{n}\right)^{nt}$$

$$A = 3000\left(1+\frac{.06}{4}\right)^{4(18)}$$

Explorations:

(a) Compare the effect of increasing **n** on the future value. Let **n** take on all the usual values: 1, 2, 4, 12, 52, 365. Complete the table below. Does a larger value of **n** increase the future value dramatically? Explain.

(b) Compare the effect of increasing **r** on the future value. Let **r** take on all the values: 1%, 5%, 8%, 9%, 13%, 20%. Complete the table below. Does a larger value of **r** increase the future value dramatically? Explain.

n	A (r = .06; P = 3000; t = 18)
1	8563.02
2	8694.83
4	8763.47
12	8810.30
52	8828.54
365	8833.25

r	A (n = 4; P = 3000; t = 18)
.01	3,590.85
.05	7,337.76
.08	12,483.42
.09	14,889.50
.13	30,006.35
.20	100,635.40

2. **Rule of 72**: Orson Buggy wants his $5,000 investment to double in 6 years. What annual interest rate must he earn? Assume interest is compounded annually.

N= 6 **I%=** PV= 5000 PMT= 0 FV= 10000 P/Y= 1 C/Y= 1 PMT: END BEGIN	$A = P\left(1+\frac{r}{n}\right)^{nt}$ $10000 = 5000\left(1+\frac{r}{1}\right)^{1(6)}$	**Explorations**: • Compare the effect of changing **t** on the interest rate, **r**. Multiply **t** and **r** in each case. Let n = 1; A = 10000; P = 5000. Use the following values for **N** = **t**: 2, 3, 4, 6, 8, 9, 12, 18, 24, 36. Complete the table below. How is this exploration related to the rule of 72?

t	r	r * t
2	41.4%	82.8
3	26.0	78
4	18.9	75.7
6	12.2	73.5
8	9.1	72.4
9	8.0	72.1
12	5.9	71.4
18	3.9	70.7
24	2.9	70.3
36	1.9	70.7

Investments double in the number of years which multiplied by the rate have product of about 72.

3. **Effective Annual Yield:** Find the effective rate corresponding to a nominal rate of 8.5% compounded quarterly.

▶Eff(r%, n) = 8.77%	$Y = \left(1+\frac{r}{n}\right)^{n} - 1$ $Y = \left(1+\frac{.085}{4}\right)^{4} - 1$

This is the APY (annual % yield). In other words, 8.5% compounded quarterly = 8.77% compounded annually

4. **Effective Annual Yield:** Find the nominal rate corresponding to an effective rate of 7.13%. Assume that the interest of the nominal rate is compounded daily.

▶Nom(r%, n) = 6.89%	$Y = \left(1+\frac{r}{n}\right)^{n} - 1$ $.0713 = \left(1+\frac{r}{365}\right)^{365} - 1$

The APY (annual % yield) means that 7.13% compounded annually = 6.89% compounded daily.