

Continuous Compounding

Compounding periods can be yearly, monthly, daily, or hourly. What if compounding occurs every minute, or every second? The number of compounding periods per year is determined by the length of each compounding period.

Objectives:

- Determine the future value of an investment compounded continuously.
- Compare effective annual rates.
- Given an effective annual rate, compute the nominal annual rate.
- Determine the future value of an investment compounded daily.

Example 1:

If \$1,000 is invested for 20 years at 8% compounded continuously, what is its future value?

1. Press **[apps]** and select **Finance**. Press **[enter]** to select **TVM Solver** from the CALC menu.

Note: The mode DECIMAL SETTING was changed to **FIX2** to round computations to two decimal places.

2. Input the values as shown, except FV. Then move the cursor to FV and press **[alpha]** **[solve]**.

Note: For continuous compounding, the number of compounding periods, C/Y, must be entered as a very large number, 1×10^{11} . On the calculator, enter 1 **[2nd]** **[EE]** 11 for C/Y.



NORMAL FIX2 AUTO REAL Radian MP

CALC VARS

1:TVM Solver...

2:tvm_Pmt

3:tvm_I%

4:tvm_PV

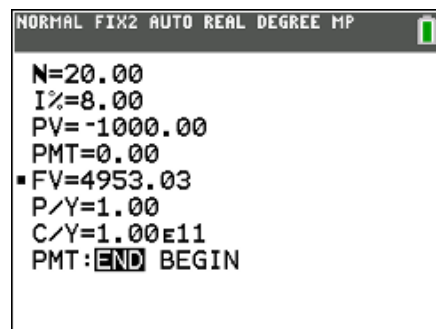
5:tvm_N

6:tvm_FV

7:npv(

8:irr(

9↓bal(



NORMAL FIX2 AUTO REAL DEGREE MP

N=20.00

I%=8.00

PV=-1000.00

PMT=0.00

FV=4953.03

P/Y=1.00

C/Y=1.00E11

PMT:END BEGIN

The future value is \$4,953.03.

Example 2:

What is the effective annual rate for 8% compounded continuously? Compare this with the effective annual rate of 8% compounded quarterly.

1. Press **2nd** **[quit]** to move to the home screen.

2. Press **apps** and select **Finance**.

3. From the CALC menu choose **Eff**.

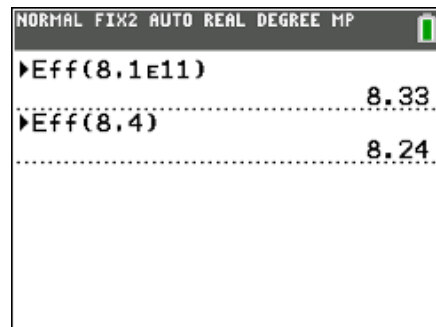
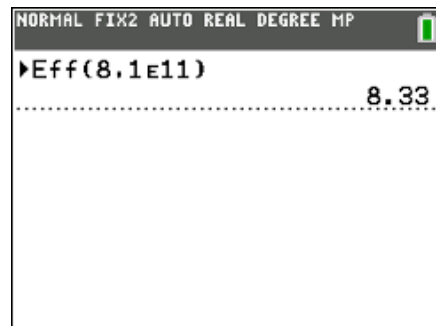
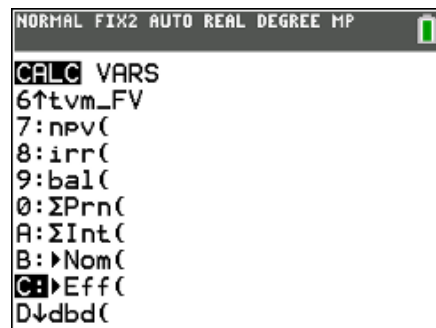
The syntax for the **Eff**(command is **Eff**(nominal rate, compounding periods).

Enter 1×10^{11} for compounding periods.

4. Type 8 **,** 1 **2nd** **[EE]** 11 **)** **enter**.

5. For the annual rate of 8% compounded quarterly, complete the **Eff**(command by typing 8 **,** 4 **)** **enter**.

Notice the difference in the effective rates for continuous compounding and quarterly compounding.



Example 3:

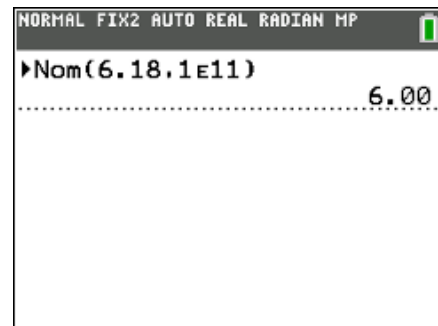
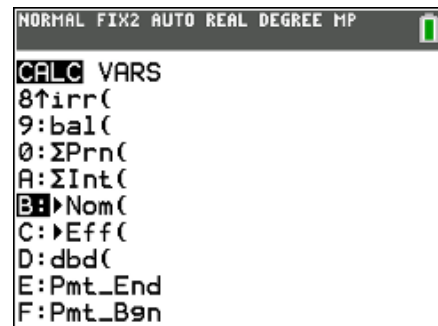
Given an effective annual rate of 6.18% compounded continuously, what is the nominal annual rate?

1. Press **apps** and select **Finance**. From the CALC menu choose **Nom**.

The syntax for the **Nom**(command is **Nom**(effective rate, compounding periods). The compounding periods for continuous compounding should be entered as a very large number, 1×10^{11} .

2. Type 6 **.** 18 **,** 1 **2nd** **[EE]** 11 **)** **enter**.

The nominal rate is 6%.



Example 4:

Rachael deposits \$100 a month for 5 years in an account that is compounded daily at 8%. How much money will be in her account at the end of 5 years?

1. Press **apps** and select **Finance**. Press **enter** to select **TVM Solver** from the CALC menu.
2. Input the values as shown, except Future Value (FV). Then move the cursor to FV and press **alpha** **[solve]**.

Rachael will have \$7,352.64.

