Appendix A to Chapter 6: Time Value of Money Problems

Computed on a Texas Instrument BA II Plus financial calculator

Before you start:

The gray 2nd key activates the functions that appear above the calculator buttons.

Example: Above the PV key, AMORT is written in gray letters. To use it, press 2nd and then press AMORT.

IMPORTANT: To clear previous work:

Press 2nd and CLR TVM (Time Value of Money).

Another clearing option is to press 2nd and Reset. It will reset the calculator to its original settings.

Data Entry

Most of the data entry will be value first, then the function. Example: press 4, then press N, the display will be N = 4.

Some values MUST be recorded in memory with the ENTER key. Be careful to make sure your entry has been acknowledged by the calculator. It will say the function you want = to the value entered. Example: P/Y = 4 or N = 36.

Make sure the C/Y and P/Y values are the same if not otherwise stated in the problem.

Example: C/Y = 4 and P/Y = 4.

Payments are cash outflows and may appear as negative (-) depending on the calculator used.

1These materials were prepared by Mary Dwyer, a SJU-MBA graduate student at the Albright College Campus.
A. Sample Problem 1: Computing Effective Rates = Annual Percentage Rate.

**Given:** Pay 8% annually, compounded quarterly. What is the effective rate?

Values:
- Periods/yr. = 4  compounded/yr. = 4  Nominal Rate = 8

Calculator:
- Press 2nd and then P/Y. Press 4 and then ENTER. It will display: P/Y = 4
- Press 2nd and then QUIT. The display will go to 0.
- Press 2nd and I CONV (you'll find it above the number 2).
  - The field NOM will appear. Press 8 and then press ENTER. It will display: NOM = 8.
- Press the ↓ key and EFF will display.
- Press the ↓ key again and C/Y will display.
- Press 4 and then ENTER. It will display: C/Y = 4.
- Press ↑ key and return to the EFF display.
- Press CPT and the calculator will return the effective rate of 8.24.

B. Sample Problem 2: Future Value for Single Deposit.

**Given:** What is the future value of $1000 invested today at 8% per annum, compounded quarterly over 5 years?

Values: N = 5  I = 8  PV = 1000  C/Y = 4

NOTE: Five years covers 20 quarters so the N value is not 5 but 20 (5*4).

**Calculator:**
- Press 2nd and P/Y.
- Press ↓ and C/Y displays. Press 4 and ENTER.
- Press 2nd and QUIT. The display will go to 0.
- Press 5. Press 2nd and then xP/Y (it appears above N). "20" will display. Press N again. Make sure display reads: N = 20. (Calculator multiplying the C/Y value of 4 by 5.)
- Press 1000 and then the PV key. The display should appear as: PV = 1000.
- Press 8 and then the I/Y key. The display should appear as: I/Y = 8.
- Press the CPT key and then press FV.
- The calculator will display the answer of $1,485.95
C. Sample Problem 3: Sinking Funds or Retirement Plans.

A sinking fund is a series of payments leading to an accumulation. Examples are IRA and 401(K) programs. The payments will be negative (-) values; the Future Value will be positive (+), and the Present Value will be zero (0).

Problem:

You want to retire in 30 years. You are starting to invest in a growth income fund that promises an ambitious rate of 15%. You can put in $200 per month. How much will you have in 30 years?

Values:

N = 30  NOTE: The payments will be monthly over 30 years: 30*12 = 360. N = 360
C/Y = 12  P/Y = 12  I/Y = 15  PMT = -200 (Remember payments are negative.)

Calculator:

Press 2nd and then press P/Y. Press 12 and then press ENTER.
Press ↓ and C/Y displays. Press 12 and then press ENTER
Press 2nd and then press QUIT.
Press 30. Press 2nd and then xP/Y. 360 will appear. Press N.
N = 360 will display.
Press 15 and then press I/Y. I/Y = 15 will display.
Press 200. Press the +/- key to the left of the = button. This will change the sign of the 200 from positive to negative. The display should be -200. Next press PMT. The display will be PMT = -200.

Press CPT and press FV. The answer displayed will be $1,384,655.92.
D. Sample Problem 4: Special Case of the Annuity Problem - Amortization

An amortization is a payment to pay down a loan that has been made in the present.

You have an opportunity to take on a 30 year $100,000 mortgage at 7.5% interest. What will your monthly payments be?

Values:
N = 30  C/Y = 12  P/Y = 12  I/Y = 7.5  PV = 100,000

{NOTE: The payments will be monthly over 30 years: 30*12 = 360. N = 360}

Calculator:
Press 2nd then press CLR TVM to clear out data from previous problems.
Press 2nd and then press P/Y. Press 12 and then press ENTER.
Press ↓ and C/Y displays. Press 12 and then press ENTER
Press 2nd and then press QUIT.
Press 30. Press 2nd and then xP/Y (it appears over the N button). 360 will appear.
Press N (to store value in “N” register)
N = 360 will display.
Press 7.5 and then press I/Y. The display will be I/Y = 7.5.
Press 100,000 and then press PV.
Press CPT and then press PMT. The payment displayed will be -$699.21.