Annuities Due (Simple and General)

Annuities due are a type of annuity where payments are made at the **beginning** of each payment period. For example, when paying rent, the rent payment (PMT) is due at the beginning of each month.

Some **keywords** to look for: - deposits/payments made at the beginning of each month

- payments made in advance

- payments starting today

- due at the beginning

Simple Annuities Due are annuities where payments are made at the beginning of each period and the compounding period is EQUAL to the payment period (P/Y = C/Y)

General Annuities Due are annuities where payments are made at the beginning of each period but the compounding period is NOT equal to the payment period (P/Y ≠ C/Y)

Calculations for Annuities Due using the BA II Plus:

To set to BGN mode: 2ND BGN 2ND SET 2ND QUIT

Top right corner of your calculator should say BGN

1. Always start with clearing your calculator: 2ND CLRTVM
2. Make sure calculator mode in BGN
3. Set P/Y = ☐, enter ↓, C/Y= ☐, enter 2ND QUIT
4. Afterwards, the sequence does not matter as long you follow step 1-3
5. CPT = ☐ what you need to find, depending on the question

Example 1:

1.) Find the FV (Future Value) at the end of the last payment period. Payments of $1000 each are made at the beginning of each year for 3 years with interest at 5% compounded annually.

| 1 | 2 | 3 (Focal Date) |

$1000 $1000 $1000

|_____|_____|

BGN, P/Y = 1, C/Y = 1 (Therefore this is a simple annuity due)
PMT= 1000 (+/-), N= 3, I/Y= 5, CPT = FV (3,310.13)

Therefore, the future value at the end of the last payment period is $3310.13

Example 2:

A four-year lease agreement requires payments of $10,000 at the beginning of every year. If the interest rate is 6% compounded monthly, what is the cash value of the lease?

(Focal Date)

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Now       2              3              4
10,000    10,000      10,000     10,000
|_____|_____|_____|
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BGN, P/Y = 1, C/Y = 12 (PY≠ CY, therefore this is an general annuity due)

PMT= 10,000(+/-), N=4, I/Y=6, CPT=PV (36,647.36)

Therefore, the cash value of the lease is $36,647.36

Practice Questions:

1.) What deposit made at the beginning of each month will accumulate to $120,000 at 8% compounded semi-annually at the end of 10 years?

2.) Laura wants to accumulate $150,000 in her bank account by depositing $1000 at the beginning of each month. If interest on the account is 5% compounded quarterly, for how long does Laura have to deposit the money?

3.) James deposited $150 at the beginning of each month for two years into his savings account. For the next four years he did not make any more deposits, leaving the money in the account. The bank charges 4% interest compounded monthly. What will the balance be after 12 years?

Answers:
1) $656.40
2) n = 116.5/12 = 9.7 years
3) $4,404.70.
   Hint: first step is to find balance [FV] after 2 years, which will become the Present Value using the FV formula for compound interest since PMT=0 for the last 4 years