

2 Activities: Concerts and Loans

Suppose there is a huge concert on 1 December 2023, and some fans took loans to watch the concert.

2.1 Ashley and Bailey

Ashley borrows PhP10,000.00 from her friend Bailey to attend the concert. Ashley admits to Bailey she can't pay in a lump sum within the year. Bailey tells Ashley she can pay her over the next twelve months of next year. Because of the time value of money, that PhP10,000.00 would be worth less if that exact same amount were paid. Bailey requests that Ashley pay a total of PhP11,000.00. They come to an agreement.

Modeled as a loan with interest, what is the effective monthly interest rate of Bailey's loan to Ashley?

Hint: Suppose a loan of A dollars is repaid by making n equal monthly payments of M dollars, beginning a month after the loan is made, with monthly interest rate r based on remaining balance. Then

$$A \times r = M \left(1 - \frac{1}{(1+r)^n} \right)$$

Note: If you feel unsure about your answer in this item, you can use the code in the next item to create an amortization schedule for Ashley and Bailey.

2.2 Catherine and Donna

Catherine also borrows PhP10,000.00 from Donna to attend the concert. They had a similar but different discussion as Ashley and Bailey. Catherine agrees to Donna's request that there will be 2% monthly interest. Donna agrees to Catherine paying 1,000 pesos each month until the loan is paid.²

Create an amortization schedule with a prescribed format having six columns in the following order:

- i. the month and year, beginning December 2023
- ii. the payment for the current month
- iii. the interest based on the previous month's balance
- iv. the net payment for the current month, subtracting the interest from the payment
- v. the new balance after these transactions
- vi. the cumulative amount Catherine has paid

Specifications:

- Specify money as numeric data-type, don't format them as currency, but round them off to two decimal places using `round(x,digits=2)`.
- Specify months as integers or numerics, 0 for December 2023, k for the k th month after December 2023, don't format as date.

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²If the remaining amount is less than PhP1,000.00, of course Catherine should only pay the amount she owes.