

## EXAM FM QUESTIONS OF THE WEEK

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### Week of July 31/06

Smith is trying to arrange a mortgage loan to purchase a house. Smith needs to borrow \$200,000.

A bank is willing to arrange two separate mortgage loans, each with principal amount \$100,000. The first loan will have monthly payments for 30 years and a nominal annual interest rate of 6% compounded monthly. The second loan will also have monthly payments for 30 years and a nominal annual interest rate of 9%.

Another financial institution offers Smith a single loan of \$200,000 at a nominal annual interest rate of  $j$  compounded monthly payable for 25 years with level monthly payments. Under the terms of the loan, Smith will pay a total amount of interest that is the same as the total interest paid on the two combined bank loans.

Find  $j$ .

**The solution can be found below.**

## **Week of July 31/06 - Solution**

The bank loan at 6% has monthly payment of  $\frac{100,000}{a_{\overline{360}|.005}} = 599.55$  , and

the bank loan at 6% has monthly payment of  $\frac{100,000}{a_{\overline{360}|.0075}} = 804.62$  .

The total paid by Smith on the two bank loans combined is

$360 \times (599.55 + 804.62) = 505,501.20$  , so the total interest paid is  
 $305,501.20$  .

This is the total interest paid under the financial institutions loan, so that total amount paid under the financial institution loan is 505,501.20. The level monthly payment is

$\frac{505,501.20}{300} = 1,685.00$  . The monthly interest rate is  $j/12$  , so

$$200,000 = 1,685.00 \cdot a_{\overline{300}|j/12} .$$

Using the calculator unknown interest function, we get  $j/12 = .00754$  , so that  $j = .0905$  .