

EXAM FM QUESTIONS OF THE WEEK

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Week of August 20/07

On January 1, 2003, Smith borrowed \$200,000 to buy a house. The loan was amortized at a nominal annual interest rate of 4.5% convertible monthly, with payments at the end of each month for 30 years. The loan agreement required that on January 1, 2008, Smith's loan would be refinanced with monthly payments for the remaining 25 years at whatever current rate of interest for loans will be on that date. Smith can afford a maximum monthly payment of \$1200 or else he will default on his loan. Find the maximum nominal rate of interest compound monthly that Smith can afford when the refinancing takes place on January 1, 2008.

The solution can be found below.

Week of August 20/07 - Solution

Smith's monthly payment on the original loan is $\frac{200,000}{a_{\overline{360}|.00375}} = 1013.37$.

On January 1, 2008, the amount still owed on Smith's loan is $1013.37a_{\overline{300}|.00375} = 182,316.83$. If this amount is refinanced for 300 months at a rate of j per month, the monthly payment will be $\frac{182,316.83}{a_{\overline{300}|j}}$.

In order for this revised monthly payment to be at most 1200, we must have $\frac{182,316.83}{a_{\overline{300}|j}} \leq 1200$, or equivalently, $a_{\overline{300}|j} \geq 151.93$.

Solving for the interest rate j in the equation $a_{\overline{300}|j} = 151.93$ results in $j = .005188$. This monthly rate corresponds to a nominal annual rate of $12(.005188) = .0623$. Any nominal rate above .0623 on January 1, 2008 will result in a refinanced loan payment above 1200 for the remaining 25 years.