

## EXAM FM QUESTIONS OF THE WEEK

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### Week of February 5/07

The Smith's own a house that has a current value of  $\$C$  that has no loans outstanding. A finance company offers the Smiths a "reverse mortgage". The terms of the reverse mortgage are that the finance company will pay the Smiths  $\$K$  at the end of each month for the next 15 years after which ownership of the house is transferred to the finance company. The monthly payment made to the Smiths is based on a nominal annual interest rate of 6% compounded monthly, so that the current house value is equal to the present value of all the monthly payments. The finance company will sell the house when it takes possession in 15 years. What average annual effective increase in the price of the house is needed in order for the company to realize an annual effective return of 8% over the 15 years?

**The solution can be found below.**

## Week of February 5/07 - Solution

The monthly payment is  $K = C/a_{\overline{180}|.005} = .00843857C$ .

The finance company is paying out  $\$K$  per month for 180 months, and in return the finance company will receive the house price at the end of those 180 months. In order for the finance company to receive a monthly effective return of  $j$  per month, the house must be sold for  $Ks_{\overline{180}|j}$ .

An annual effective rate of interest of 8% is equivalent to a monthly rate of  $j = (1.08)^{1/12} - 1 = .006434$ . At the end of 180 months, the finance company must sell the house for  $Ks_{\overline{180}|j} = .00846857C \cdot s_{\overline{180}|.006434} = 2.85$   
 $= 2.85 \times \text{current house price}.$