

## REFINANCING & INTEREST SAVINGS (CB3bm)

You took out a 30-year mortgage (monthly payments) for \$130,000 at 8.90% and payment number 35 is due today. You are deciding whether you should refinance the outstanding principal by borrowing at today's lower rate of 6.70% an amount that just pays off the old loan. The new loan is for 30 years as of today. The total fees for getting the new loan equal 3.1% of the borrowed principal, and you will amortize the fees over the life of the new loan. How much would you save in interest expense over the life of the loan?

ANSWER: First find the PAYMENT on the original loan from the present value relation:

$130,000 = PMT \times \{ 1/(1+.089/12)^1 + \dots + 1/(1+.089/12)^{360} \}$ ; on calculator,  $PV=130,000$ ;  $I/Y=8.9$  ( $P/Y=12$ ),  $N=360$ , so find that  $PMT=\$1,037$ . If you sent in 35 payments, then there remain 325 payments. Solve PV in the following equation.

$$PV = 1037 \times \{ 1/(1+.089/12)^1 + \dots + 1/(1+.089/12)^{325} \}.$$

On calculator, set  $N=325$  {and still  $I/Y=8.9$  ( $P/Y=12$ ) &  $PMT=\$1,037$ }. Find that  $PV=127,115$ . That's the loan's outstanding principal. If you send in 325 payments of \$1037 each that represents total expenditure of \$336,917 ( $=325 \times 1037$ ), and total interest of \$209,803 ( $=\$336,917 - 127,115$ ).

Find the fees of \$3,941 by multiplying ( $\$127,115 \times 0.031$ ); the new loan amortizes the fees so the loan is for \$131,055 ( $=\$127,115 \times 1.031$ ). The new loan's payment satisfies  $131,055 = PMT \times \{ 1/(1+.067/12)^1 + \dots + 1/(1+.067/12)^{360} \}$

On calculator,  $PV=131,055$ ;  $I/Y=6.7$  ( $P/Y=12$ ),  $N=360$ , so find that  $PMT=\$845.67$ . If you send in 360 payments of \$845.67 each that represents total expenditure of \$304,442 ( $=360 \times 845.67$ ), and total interest of \$173,386 ( $=\$304,442 - 131,055$ ).

The refinancing saves you \$36,416 over the life of the loan ( $= \$209,803 - \$173,386$ ).