**Financial.**

I like a house in Beverly Hills and want to buy it with a 25-year loan. The original price was $ 850,000 and the rate is 5%, 25 years fron now, you will need to make $50,000 ending payment. Because my My income is increasing, so I have the confidence to buy it , but the payment is increase by 5%. I want to create a form to see how much I have to pay each month

**Discussion.**

For this problem, I need to pay $850,000 and ending payment is $50,000, is mean I need to payment 1 time $80000 and the other to loan, my rate is by 5% for 25years. So I need to decide how much I need to pay first month and for the month is increasing 5% per years. For the 1 month is X, 2 month is X, but the next year is 1.05\*X, the 3rd year is 1.05^2\*X until the 25years, need to pay 1.05^24\*X. so, we need to create the table to check every month how much we need to pay.

**Model.**

Parameters:

$L\_{ }$: *Actual loan amount*

B: *Balloon payment*

R: *monthly interest rate= 0.05/12*

$P\_{ }$: *yearly increase in monthly payments = 1.05*

Decisions:

$m\_{1}$: *Monthly payment for year 1*

Calculated Parameters:

$Q\_{i}$: *Ending balance after month i, where i* $\in $*(1,2,….25\*12)*

$Q\_{i }$= $Q\_{i-1}$*–* $(m\_{i}$*-*$ Q\_{i-1}$*\*R)*

$Q\_{0 }$*= L*

$m\_{i}$: *Monthly payment for year* $i$

$m\_{j}$= P \* $m\_{j-1 }$ where j $\in $*(1,2,….25) : Each year the monthly payment increases P times. Please note monthly payments are fixed within a year.*

Objective: NONE\*

Constraints:

$ Q\_{25\*12}-B=0 \left(1\right)$ Amount remaining after balloon payment should be fully repaid after 25 years

 $m\_{1 }\geq 0$ (2) Non- negative monthly payment

Notes:

\* This is a very special case where there is no objective defined. The reason here is that the problem is fully constrained: the loan must be paid off in 25 years and the balloon payment is already specified.

Constraint (2) should not be binding, as constraint (1) ensures that a positive payment is needed.

**Optimal Solution.** The following is the solution obtained from Excel Solver.

The monthly payment for year 1 must be 2869.707669$ to pay off the loan in 25 years.



