1. A loan is amortized over five years with monthly payments at a nominal interest rate of 9% compounded monthly. The first payment is 1000 and is to be paid one month from the date of the loan. Each succeeding monthly payment will be 1.5% lower than the prior payment. Calculate the outstanding loan balance immediately after the 40th payment is made.

2. A loan of 1000 at interest of \( i = .01 \) per period is amortized by payments of 250 per period, starting one period after the loan, for so long as necessary, plus a final smaller payment one period after the last regular payment.

(a) Solve for the number of regular payments

(b) Solve for the final smaller payment

(c) Construct the amortization table
3. The borrower of a loan of 5000 makes monthly interest payments to the lender at rate $i^{(12)} = 0.15$, and monthly deposits of 50 to a sinking fund earning $i^{(12)} = 0.09$. When the sinking fund reaches 5000 the borrower will repay the principal and discharge the loan. Find the total amount paid by the borrower over the course of the loan.

4. A loan of 1500 is repaid by annual payments of principal starting one year after the loan is made, plus quarterly payments of interest on the outstanding balance at a quarterly rate of 4%. Find the present value of the payments to yield an investor a quarterly rate of 3%
   
   (a) if principal payments are 100 per year for 15 years

   (b) if principal payments are 100 in the 1st year, 200 in the 2nd year, ..., 500 in the 5th year

   (c) if principal payments are 500 in the 1st year, 400 in the 2nd year, ..., 100 in the 5th year