

SAMPLE PROBLEMS FOR EXAM I

MATH 630 Actuarial Math, 2/19

For the exam show your work to ensure credit for the solution of each problem. Put a box around the answer to each problem. No use of calculators, books or notes is allowed. No use or viewing of electronic devices is allowed.

1. A loan of 1000 has semiannual payments of P that commence six months after the loan and continue for ten years. The loan rate is 10% convertible semiannually. Find an expression for the loan balance immediately after the payment at the end of the fifth year.
2. The amount 100 is invested in an account that for the first two years the effective annual interest rate is 10%. Then the interest rate is changed for the next two years so that it is 8% convertible semiannually. Find the value of the account at the end of four years.
3. Let i be the annual rate of interest. Find an expression for the initial value of an annuity that commences on 1 January and pays 2 at the end of each month for 15 years.
4. Find explicitly the effective rate of interest if payments of 1000 at $t=0$, 500 at $t=1$ accumulate to 3000 at the end of two years ($t=2$).
5. In return for payments of 400 at the end of 3 years and 700 at the end of 8 years a woman agrees to pay X at the end of 4 years and $2X$ at the end of 6 years. If $i = .14$ then find X .
6. Find the accumulated value of 6000 invested for ten years if the (compound) interest rate is 7 percent per year for the first 4 years and 11 percent per year for the last six.
7. Eric deposits 8000 in an account at the beginning of one year. Two years later he deposits an additional 6000 in the account. If no more deposits or withdrawals are made, then how much is in Eric's account 9 years after the initial deposit of 8000? Let i be the annual interest rate.

8. The amount of 1000 is deposited in an account that for the first three years pays 12% convertible quarterly. For the following two years the effective annual interest rate is 8%. Find the value of the account at the end of five years.