Provide your **final answer only** for the following problems.

**Problem 3.1.** (2 points) The interest-rate cap pays the difference between the realized interest rate in a period and the cap rate.

**Solution:** FALSE
The cap pays the excess above the cap rate if it is positive, not simply the difference between the two.

**Problem 3.2.** (2 points) A caplet is a financial instrument used as protection against the increase in the interest rate for all repayment installments of a loan to be repaid over multiple periods.

**Solution:** FALSE
The caplet only applies to one installment; it’s the cap that provides protection over multiple periods.

Provide your **complete solution** for the following problem(s):

**Problem 3.3.** (6 points)
Consider a three-period binomial interest-rate tree with \( r_0 = 0.06 \) which models **continuously compounded** annual interest rates. You are given that after every time-step the value of the interest rate can either increase by 0.02 or decrease by 0.02.

The risk-neutral probability of an up movement in a single step is given to be 1/2.

What is the time-0 price of a zero-coupon bond redeemable at time-3 for $100?

**Solution:**
\[
100P(0, 3) = 100 \times e^{-0.06} \times 0.25 \times \left[ e^{-0.18} + e^{-0.14} + e^{-0.1} + e^{-0.06} \right] = e^{-0.12} \times 0.25 \times \left[ e^{-0.12} + e^{-0.08} + e^{-0.04} + 1 \right] = 83.61.
\]