Provide a complete solution to the following problem(s):

**Problem 1.1.** (8 points) *Source: Problems 24.12 and 24.13 from the textbook.*

Here is an incomplete Black-Derman-Toy interest rate tree with effective annual interest rates at each node.

(i) (2 pts) Calculate \( r_{ud} \).

(ii) (3 pts) What is the 3-year zero coupon bond price per $100 at maturity implied by this tree? Assume that the bond is issued at time 0.

(iii) (3 pts) What volatilities of annual effective interest rates were used to construct the above tree?
Problem 1.2. (8 points) Source: Problems 24.12 and 24.13 from the McDonald textbook.
Here is an incomplete Black-Derman-Toy interest rate tree with effective annual interest rates at each node.

(i) (2 pts) Calculate $r_{uu}$.
(ii) (3 pts) What is the 3-year zero coupon bond price per $100 at maturity implied by this tree? Assume that the bond is issued at time 0.
(iii) (3 pts) What volatilities of annual effective interest rates were used to construct the above tree?