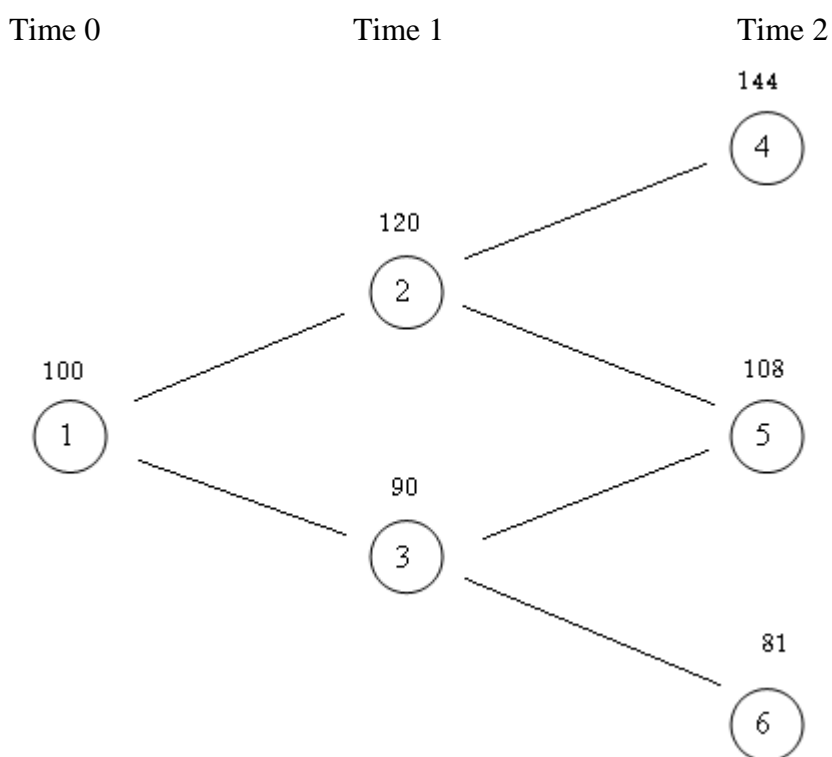# EXAM MFE QUESTIONS OF THE WEEK

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Week of February 26/07

You are given the following two-period binomial tree for stock prices. The stock price is above the numbered node. The annual effective interest rate is 10%. Assume the stock pays no dividends for parts (a) to (d).

Time 0   Time 1   Time 2

(a) Find the risk-neutral probabilities for the stock price movements. Verify that these probabilities are the same for each branch in the tree.

(b) A call option with strike price 110 expires at time 1. Find the replicating portfolio and the price of the option at time 0.

The solution can be found below.

Week of February 26/07 - Solution

(a) At node 1 the risk-neutral probabilities are $\frac{1.1-.9}{1.2-.9} = \frac{2}{3}$ for an up-move and $\frac{1}{3}$ for a down move. Since the up and down moves are at rate 1.2 and .9 for nodes 2 and 3, the risk-neutral probabilities stay the same.

(b) $\Delta = \frac{10-0}{120-90} = \frac{1}{3}$ and $B = \frac{1}{1.1} \frac{1.2(0)-(.9)(10)}{1.2-.9} = -\frac{30}{1.1} = 27.27$.

Option price is $\Delta S + B = \frac{1}{3}(100) - \frac{30}{1.1} = \frac{20}{3.3} = 6.06$.