Practice problems for Lecture 2

1. (short answer) Answer each question in no more than one sentence of normal length.

a. Define *American call option*.

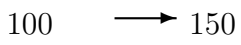
b. Buying a call option is buying or selling vol?

c. Buying a put option is a long or short position in the stock?

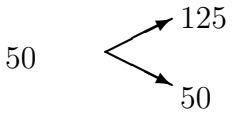
d. Does an European put option price increase or decrease in maturity?

2. A Simple Option Pricing Problem in One Period

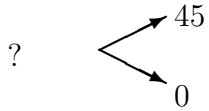
Riskless bond (interest rate is 50%):



Stock:



Derivative security (call option with a strike of 80):



a. What is the portfolio of the stock and the bond that replicates the option?

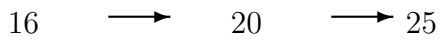
b. What is the option price (given by the price of the replicating portfolio)?

c. What are the risk-neutral probabilities of the two states? Verify that your answer gives the correct price for the stock, the bond, and the option. Reminder: the formula for the risk-neutral probability of an up move is $(r-d)/(u-d)$.

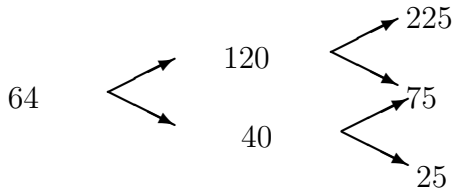
d. (thought question—answer in a sentence or two of ordinary length) Suppose we have inherited many shares of the stock and would like to trade them to diversify but we are precluded from trading the stock due to terms of an inheritence. If the inheritence does not preclude trading the option, how can this help us? (Note: do not perform any computations in this answer.)

3. Two-period model: futures option versus stock option maturing in one period.

Riskless bond (riskfree rate is 25%):



Stock price (no dividends):



The actual probabilities are 2/3 for the up state and 1/3 for the down state.

a. For all nodes in the tree, compute the futures price for a futures on the stock, maturing at the end.

b. Compute the price of a futures put option, with the put maturing in the middle time, with a strike price of 70, on the futures maturing at the end.

c. Compute the price of a put option on the stock, with the put maturing in the middle time with a strike price equal to 70.