

EXAM MFE QUESTIONS OF THE WEEK

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Week of March 12/07

A stock paying no dividends has a volatility of 30%. The continuously compounded risk free rate of interest is 5%. The forward price of the stock for delivery in one year is \$100. An American put option on the stock has a strike price of \$100. Using a binomial model with 4 steps and $u = e^{\sigma\sqrt{h}}$ and $d = e^{-\sigma\sqrt{h}}$ to determine that price and optimal exercise policy for the option at each node in the binomial tree.

The solution can be found below.

Week of March 12/07 - Solution

The steps are each $\frac{1}{4}$ -year, so $u = e^{.3\sqrt{.25}} = 1.16183$ and $d = .86071$.

The risk neutral probability of an up-step at each node is $\frac{e^{(.05(.25))} - .86071}{1.16183 - .86071} = .5043$.

In the tree on the next page, the stock price is given above each node. The hold price below each node is the expected present risk-neutral value of the two possible branch values. If the exercise price is above the hold price, then it is optimal to exercise.

				173.33
				<input type="radio"/>
				Intrinsic 0
				Hold 0
				Exercise? NO
				Value 0
			149.18	
			<input type="radio"/>	
			Intrinsic 0	
			Hold 0	
			Exercise? NO	
			Value 0	
		128.40		
		<input type="radio"/>		
		Intrinsic 0		
		Hold 1.17		
		Exercise? NO		
		Value 1.17		
	110.52			
	<input type="radio"/>			
	Intrinsic 0			
	Hold 5.51			
	Exercise? NO			
	Value 5.51			
95.12				
<input type="radio"/>				
Intrinsic 4.88				
Hold 12.27				
Exercise? NO				
Value 12.27				
	81.87			
	<input type="radio"/>			
	Intrinsic 18.13			
	Hold 19.47			
	Exercise? NO			
	Value 19.47			
		95.12		
		<input type="radio"/>		
		Intrinsic 4.88		
		Hold 10.06		
		Exercise? NO		
		Value 10.06		
		81.87		
		<input type="radio"/>		
		Intrinsic 18.13		
		Hold 16.88		
		Exercise? YES		
		Value 16.88		
		70.47		
		<input type="radio"/>		
		Intrinsic 29.53		
		Hold 28.29		
		Exercise? YES		
		Value 28.29		
		60.65		
		<input type="radio"/>		
		Intrinsic 39.35		
		Hold 38.10		
		Exercise? YES		
		Value 39.35		
		52.50		
		<input type="radio"/>		
		Intrinsic 47.80		
		Hold 47.80		
		Exercise? YES		
		Value 47.80		