Self Test
Energy Options Markets for Managing Risk

Click on True or False to test your knowledge of the chapter.

1. True False The value of a European call at expiration depends on the value of the strike price and the value of the underlying asset.

2. True False Unlike an American option, a European option can only be exercised at expiration. The value of a put at expiration depends on S_T and K. At prices for the underlying asset above K, the put has no value and will be allowed to expire. A put is said to be in the money if $S_t < K$, at the money if $S_t = K$, and out of the money if $S_t > K$.

3. True False. The value of a put or call futures option is not dependent on the value of the underlying physical asset and as such, the price of the asset is not relevant.

4. True False European options trade in Europe and Asia, whereas American options trade in North and South America.

5. True False The variance of the following prices {10,20,30,40} is 20.

6. True False The following table gives the probability distribution function of the discrete variables A and B, $f(A_i, B_j)$. The mean values of A and B are 1.5 and 1.7, respectively. The covariance of A and B is $\sigma_{AB} = 3$.

A↓ B→

	-5	0	4	5
1	0.05	0.20	0.30	0.09
3	0.05	0.12	0.14	0.05

7. True False Volatility of an underlying energy price raises the value of an energy put/call option.

8. True False If the underlying asset price increases for an American option with a fixed strike price of K, the call value increases and the put decreases.

9. True False If the interest rate increases, the value of a call goes up, and the value of a put goes down.

10. True False When the expiration date of an American option is more distant, the value of put and call options should decrease in value due to increased uncertainty.

11. True False An energy futures option gives a right but not an obligation to the contract holder to buy (call) or to sell (put) an energy futures at a set strike or exercise price by a certain date.

12. True False An American option can be exercised any time up to the expiration, but a European option can only be exercised on the expiration date.

13. True False 'In the money' means that the strike price on my <u>call</u> option is lower than the market price and I will want to let the option expire, and 'out of the money' means that the strike price on my <u>call</u> option is greater than the market price and I will want to sell the option.

14. **True** **False** You have an underlying energy asset worth 50 dollars that will either go up 10% in value or fall 15% in value in one period. You have a call option on this asset with a strike price of $52. c_u, which is the value of the call when the underlying asset price goes up, is $5 and c_d, which is the value of the call when the underlying asset price goes down, is -$7.5.

15. **True** **False** The net change in the price of an option is the difference between the daily high and low price for an option.

16. **True** **False** You have an underlying energy asset worth 50 dollars that will either go up 10% in value or fall 15% in value in one period. You have a put option on this asset with a strike price of $49. p_u, which is the value of the put when the underlying asset price goes up, is $0 and p_d, which is the value of the put when the underlying asset price goes down, is $6.5.

17. **True** **False** You have a put option on an asset that historically has tended to move up 5% or down 10% annually. The spot price of the asset is $200 and the strike price of the put is $201. The risk free annual interest rate is 3% and the option expires in a year. The value of the put is about $2.72.

18. **True** **False** Suppose that an underlying asset is worth $100 this period. The price of the asset can go up to 120 or fall to $80 in the next period. Assuming that the risk free rate is 4% and the strike price of the call is 98. The value of the call is about $12.69.

19. **True** **False** Assume a stock price is $50 and next year it will either rise by 50% or fall by 20%. The risk free rate is 10%. The value of a call option with an exercise price of $55 which expires in a year is equal to $7.82

20. **True** **False**. Assuming a stock price of $100 and assuming that it could go up by 10% or down by 5%. If the risk free rate is 5%, then the equivalent risk free probabilities associated with these market price changes are 0.667 and 0.333, respectively.

21. **True** **False** Assume a stock price is $150 and it is forecasted that it will either increase by 25% or fall by 20% in a year times. The risk free interest rate is 6% per annum. The value of a call option with a $160 strike price would be $7.26.

22. **True** **False** If $S_t = 103$ and $S_{t-1} = 105$, then the continuous daily rate of return is about 1.9%.

23. **True** **False** The daily variance for an asset's return is 0.0012, so the annual variance is $365*0012 = 0.438$.

24. **True** **False** The monthly variance for an asset's return is 0.02, so the annual variance is$(250/20)*0.2 = 2.5$.

25. **True** **False** The monthly variance is 0.6, so the weekly variance is 0.15.

26. **True** **False** Your daily variance is 0.00017, the risk free annual rate of interest is 0.12, and your lattice is monthly or $\Delta t = 1/12$, then U= 1.06, D= 0.944, and p = 0.529.

27. **True** **False** The spot price for the above underlying asset is 60. U = 1.06, D = 0.943, and p = 0.53. The values for the lattice for the underlying asset going 3 periods out are

71.461

67.416

63.600   63.568

60.000   59.970

        56.580   56.551

                53.350

                        50.309

28. True False Again assume the spot price for the above underlying asset is 60. U = 1.06, D = 0.943, and p = 0.53. The probabilities attached to 63.6 in column 2 and 63.568 in column 4 in the above lattice are 0.53 and $3*(0.53)^2(0.47) = 0.396$.

29. True False Again assume the spot price for the above underlying asset is 60. U = 1.06, D = 0.943, and p = 0.53. Consider a European put option with a strike price of $62 on the underlying asset. The option expires in 3 months. The interest rate is 0.005 per month. The value of European put option today is about $3.083.

30. True False Again assume the spot price for the above underlying asset is 60. U = 1.06, D = 0.944. p = 0.53. Consider a European put option with a strike price of $62 on the underlying asset. The option expires in 3 months. The interest rate is 0.005 per month. The value of European put option in period 2 is 0 because you cannot exercise the option until the fourth period.

31. True False Assuming a stock price of $120 that will rise next year by 20% or fall by 10%, a risk free rate of 5%, and a European put option with an exercise price of $120 expiring in one year, the value today would be worth $18.00.

32. True False. Consider an American put option with a strike price of $62 on a stock whose current price is $60. The option expires in 3 periods and in each period the underlying asset price either goes up by 1.06 with probability 0.53 or down by 0.943 with probability 0.47. The value of the risk-free probability is 0.5% per period. Then the value of an American put option is $3.169.

33. **True False**. You have a European call option which expires in 3 months with a strike price of $62 on an asset whose current price is $60. Each month the asset price either goes up by 1.06 with probability of 0.53 or down by 0.943. The annual value of risk-free rate is 6%, the value of European call option is $2.00.

34. True False. You have an American call option which expires in 3 months with a strike price of $62 on an asset whose current price is $60. Each month the asset price either goes up by 1.06 with probability of 0.53 or down by 0.943. The annual value of risk-free rate is 6%, the value of an American call option is $2.

35. True False. Option trading strategies as a rule, may not involve real assets.

36. True False. An option can be valued using a replicating formula composed of the underlying asset and a risk free bond.

37. True False A plain vanilla swap is an exchange of two floating rate cash flows.

38. True False Whether an option is an American or European option depends on whether the exchange it is traded on is in America or Europe.

39. True False An option price only depends on the underlying asset price and the strike price.

40. True False A current stock is trading for $55. An investor made the following short straddle position: one put contracts for $15 and one call for $10 at strike prices of $60. The next table shows the gains/losses realized when $S_t = \{60, 40, 70\}$.

Stock Price, ($)	Value of Call, $	Value of Put, $	Overall Gain(+)/Loss(-), ($)
60	15 - 0	10 - 0	+25
40	15 - 0	10 - 20	+5
70	15 - 10	10 - 0	+15