## Chapter 7: Option pricing in discrete time

### Answers to self test questions

1. (d) Sell something before a pre-specified date
2. (a) Right to buy something
3. (d) Obligation to sell something
4. (b) Right to sell something
5. (c) Obligation to buy something
6. Correct answers are:

| | | |
|---|---|---|
| (a) | The buyer of a call holds a | Long position |
| (b) | The seller of a call holds a | Short position |
| (c) | The buyer of a put holds a | Long position |
| (d) | The seller of a put holds a | Short position |

7. (a) In the money
8. (a) In the money
9. (c) The stock price equals the exercise price plus the future value of the option premium
10. (c) The option premium
11. (a) Unlimited
12. (c) The option premium
13. (b) The exercise price
14. (a) Unlimited
15. (c) The option premium
16. (b) The exercise price
17. (c) The option premium
18. (d) None of the above
    The put-call parity says: share + long put = long call + PV(X)
19. (a) The stock price
20. (a) The stock price
21. (d) The present value of the exercise price
22. (c) The exercise price

23. (c) Decreases with the exercise price

24. (a) Increases with exercise price

25. (c) A security that pays off 1 in only one state and 0 in all other states

26. Correct answers are:

| | | |
|---|---|---|
| (a) | The real probability that the state occurs | True |
| (b) | The risk neutral probability that the state occurs | False |
| (c) | The marginal utility of money in the state | True |
| (d) | The degree of risk aversion in the market | True |

27. Correct answers are:

| | | |
|---|---|---|
| (a) | In every state there is at least one security that has a payoff | True |
| (b) | State securities can be constructed for all states | True |
| (c) | New, non-redundant securities can be constructed | False |
| (d) | The existing securities span all the states | True |

In mathematical terms, the market is complete if the payoff matrix is square and non-singular.

28. Correct answers are:

| | | |
|---|---|---|
| (a) | No arbitrage opportunities exist | True |
| (b) | No new, non-redundant securities can be constructed | False |
| (c) | No security or combination of securities dominates another | True |
| (d) | The existing securities span all the states | False |

In probability terms, a market is arbitrage free if an equivalent martingale measure exists. It is complete if the equivalent martingale measure is unique.

29. (d) The expected payoff, calculated with the risk neutral probabilities, discounted at a risk free rate
Answer (a) is a correct valuation method, but it is not what risk neutral valuation says.

30. Correct answers are:

| | | |
|---|---|---|
| (a) | The expected return of all assets is the risk free interest rate | True |
| (b) | All asset prices are martingales | False |
| (c) | All properly discounted asset prices are martingales | True |
| (d) | All investors are assumed to be risk neutral | False |

31. Correct answers are:

| | | |
|---|---|---|
| (a) | Risk neutral probabilities are discounted state prices | False |
| (b) | State prices are discounted risk neutral probabilities | True |
| (c) | Risk neutral probabilities are compounded state prices | True |
| (d) | Risk neutral probabilities are standardized (i.e. divided by their sum) state prices | True |

32. (c) Two linearly independent securities are traded

33. (c) $d < r < u$