**Introduction to Mathematical Finance**

**Problem Sheet 5**

1. Two parties agree to a forward contract to exchange 100 shares of a stock one year from now for $72 per share. Immediately after they initiate the contract, the price of the underlying stock increases to $74 per share. This share price increase represents a gain for:  
**A** If the value of the underlying is greater than the forward price, this increases the value of the forward contract, which represents a gain for the buyer and a loss for the seller.

2. For a forward contract on an asset that has no costs or benefits from holding it to have zero value at initiation, the arbitrage-free forward price must equal:  
**B** For an asset with no holding costs or benefits, the forward price must equal the future value of the current spot price, compounded at the risk-free rate over the term of the forward contract, for the contract to have a value of zero at initiation. Otherwise an arbitrage opportunity would exist.

3. Which of the following is most similar to the floating-rate receiver position in a fixed-for-floating interest-rate swap?  
**B** The floating-rate receiver (fixed-rate payer) in a fixed-for-floating interest-rate swap has a position similar to issuing a fixed-coupon bond and buying a floating-rate note.

4. The lower bound for the value of a European put option is:  
**B** The lower bound for a European put ranges from zero to the present value of the exercise price less the current stock price, where the exercise price is discounted at the risk-free rate.

5. The put–call-forward parity relationship least likely includes:  
A. a risk-free bond.  
B. call and put options.  
C. the underlying asset.

**C** The put–call-forward parity relationship is F0(T)(1 + Rf)–T + p0 = c0 + X(1 + Rf )–T, where X(1 + Rf )–T is a risk-free bond that pays the exercise price on the expiration date, and F0(T) is the forward price of the underlying asset.

6. The put–call parity relationship for European options must hold because a protective put will have the same payoff as:  
**B** Given call and put options on the same underlying asset with the same exercise price and expiration date, a protective put (underlying asset plus a put option) will have the same payoff as a fiduciary call (call option plus a risk-free bond that will pay the exercise price on the expiration date) regardless of the underlying asset price on the expiration date.