

MATH39032  
Mathematical Modelling of Finance  
Worksheet 1

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In the following question tick **all** options that apply.

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1. The value of a contract is calculated at time  $t = 0$  to be  $V = \mathcal{L}10e^{2r}$ , where  $r$  is the risk-free return rate. What is the correct interpretation of this contract?
- the value now of receiving  $\mathcal{L}10$  in 2 years;
  - the value now of investing  $\mathcal{L}10$  for 2 years;
  - the value now of  $\mathcal{L}10$  invested 2 years earlier.
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2. Which of the following statements are true?
- there is no difference between buying a share and buying a futures contract on the share if the share does not pay dividends;
  - buying the share is more risky than buying a futures contract on the share;
  - dividend payments affect the price of a futures contract.
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3. Any investor want to sell an asset they own at some future date, for tax reasons they do **not** want to earn more than  $\mathcal{L}150$  per share sold at the point of sale. What contracts will help them out?
- selling call options with strike price  $\mathcal{L}150$ ;
  - buying put option with strike price  $\mathcal{L}150$ ;
  - selling futures (if  $F < 150$ );
  - selling put options with strike price  $\mathcal{L}150$ .
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4. An investor has bought a European put option from a Bank for \$24.50. The option is to sell AAPL shares at a strike price of \$140 in one years time and is held until maturity. You may assume that the cost of borrowing is  $r = 0.02$ . For what values of  $S_T$  does the investor make a profit?

- $S_T < \text{£}115$ ;
  - $S_T > \text{£}165$ ;
  - $S_T > \text{£}161.73$ .
  - $S_T > \text{£}112.73$ .
  - $S_T < \text{£}116$ .
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5. A share with price  $S = 167.23$  is trading on the market, it is not due to pay any dividends in the next 12 months. There is offer on the exchange to sell the forward contract with a maturity in 12 months and a delivery price of  $F = 175.24$ . Given that the risk-free rate of return is 1%, calculate the value of any arbitrage opportunity.

- 8.02;
  - 9.78;
  - 6.28;
  - 6.34;
  - There is none.
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6. A coupon-bearing bond pays coupons. Consider a coupon-bearing bond with a five-year maturity, which pays  $\text{£}100$  on maturity, together with a coupon of  $\text{£}3$  at the end of each year up to and including maturity. What is the value (today) of this bond? Assume an interest rate of 1.85% for the lifetime of the bond.

- 115
  - 104.84
  - 105.36
  - 107.03
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7. Go to the Eurex website and get the daily settlement prices for a call and put option (with same maturity and exercise price) on EURGBP exchange rate. Does the put-call parity hold?

*Hint: choosing a short maturity can render interest rates irrelevant.*

- Yes, exactly
  - Close enough
  - No not at all
  - How do I calculate this?!?
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