

### Problems.

1. Find the current value of a bond with a zero coupon and its interest rate for the case of compound interest, which is accrued a) 4 times a year; b) continuously; if  $B(0,5;1) = 0,9312$  and its nominal value  $F = 1$ .
  2. Find the price of a bond with face value NOK100 and NOK 5 annual coupons that matures in four years, given that the continuous compounding rate is 8%.
  3. Find the present value of NOK100, 000 to be received after 100 years if the interest rate is assumed to be 5% throughout the whole period and daily compounding applies.
  4. The present value of a bond with a zero coupon is NOK 1,000, the price of the bond is NOK 5 800. Implementation will take place in 4 years. Determine the interest rate of the bond.
  5. Find the price of a 4-year bond with a face value of NOK 100,000 and a 15% coupon, which is paid at the end of every six months, if the rate of the bond is 10%.
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6. Suppose that  $S(0) = 17$  dollars,  $F(0, 1) = 18$  dollars,  $r = 8\%$ , and shortselling requires a 30% security deposit attracting interest at  $d = 4\%$ . Is there an arbitrage opportunity? Find the highest rate  $d$  for which there is no arbitrage opportunity

7. Suppose that the price of stock on 1 April 2000 turns out to be 10% lower than it was on 1 January 2000. Assuming that the risk-free rate is constant at  $r = 6\%$ , what is the percentage drop of the forward price on 1 April 2000 as compared to that on 1 January 2000 for a forward contract with delivery on 1 October 2000?

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8. Describe the payoff function (of the share price ) for the following securities;

- 1) 1 call option and 2 put options are bought with strike prices  $K$  (strip);
- 2) 1 call option with strike price  $K_1$  was bought and 1 call option with strike price  $K_2$ ,  $K_1 < K_2$  was sold (bull spread).

9. Draw a graph of payments (from the share price) for the following securities: 1 call option with strike price  $K$  and 2 put options with strike price are  $2K$ .