Pricing of Financial Securities and Derivatives **Midterm Exam 12.12.2013**
Time: 2.5 hours **Examinator: Henrik Palmén**
Calculator may be used
Minimum to pass: 25p

Write your name, student number, and date on the paper.

1. The yield to maturity on two 10-year maturity callable bonds currently is 7%. Each bond has a call price of 1,100 and a par value of 1,000. One bond has a coupon rate of 6%, the other 8%. The coupons are paid annually. Assume that the bonds are called as soon as the present value of their remaining payments exceeds their call price. What will be the capital gain on each bond if market interest rate suddenly falls to 6%. (BKM cc 14.4) **15p**

2. The term structure for zero-coupon bonds is currently: for a 1-year zero the YTM is 4%, 2-year zero it is 5%, and 3-year zero it is 6%. Next year at this time *you* expect the term structure to be: 1-year zero YTM will be 5%, 2-year will be 6% and 3-year will be 7%. (BKM 15.10)

a) What do *you* expect the rate of return to be over the coming year on a 3-year zero-coupon bond?
b) Under the expectations theory, what yields to maturity does *the market* expect to observe on 1- and 2- year zeros at the end of the year? Is the market's expectation of the return on the 3-year bond over the coming year greater or less than yours? **15p**

3. A futures exchange has just introduced a single-stock futures contract on a company stock. Currently the company pays no dividends. Each contract is for delivery of 1000 shares of stocks in 1 year. The risk-free interest rate is 6% per year. (BKM 19.13)

a) If the stock now sells for 120 per share, what should be the futures price?
b) If the share price falls by 3%, what will be the change in futures price and the change in the investors margin account?
c) If the margin on the contract is 12,000, what is the percentage return on the investor's position? **10p**

4. A stock price is currently \$50. It is known that at the end of six months it will be either \$45 or \$55. The risk-free interest rate is 10% per annum with continuous compounding. What is the value of a six-month European put option with a strike price of \$50? (Hull 12.4) **15p**

$$p = \frac{e^{r\Delta t} - d}{u - d}, \qquad \begin{aligned} c &= S \times N(d_1) - Xe^{-rT} \times N(d_2) \\ p &= Xe^{-rT} \times N(-d_2) - S \times N(-d_1) \end{aligned}, \qquad \begin{aligned} d_1 &= \frac{\ln\left(S/X\right) + \left(r + \sigma^2/2\right)T}{\sigma\sqrt{T}} \\ d_2 &= d_1 - \sigma\sqrt{T} \end{aligned}$$