Pricing of Financial Securities and Derivatives **Midterm Exam 11.12.2014**
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.

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1. On January 1, you sold short one round lot (that is, 100 shares) of a company's stock at 21 per share. On March 1, a dividend of 2 per share was paid. On April 1, you covered the short sale by buying the stock at a price of 15 per share. You paid 0,5 (50 cents) per share commission for each transaction. What is the value of your account on April 1? (BKM 3.17) **10p**

2.

a) The spread between the yield on a three-year corporate bond and the yield on a similar risk-free bond is 50 basis points. The recovery rate is 30%. Estimate the average hazard rate per year over the three-year period.

b) Suppose the spread between the yield on a five-year bond issued by the same company (as in a)) and the yield on a similar risk-free bond is 60 basis points. Assume the same recovery rate of 30%. Estimate the average hazard rate per year over the five-year period. What do your results indicate about the average hazard rate in years 4 and 5? (Hull 23.2) **15p**

3. A financial institution has entered into an interest rate swap with company X. Under the terms of the swap, the financial institution receives 10% per annum and pays six-month LIBOR on a principal of $10 million for five years. Payments are made every six months. Suppose that company X defaults on the sixth payment date (end of year 3) when the interest rate (with semi-annual compounding) is 8% per annum for all maturities. What is the value of the loss to the financial institution? Assume that six-month LIBOR was 9% per annum halfway through year 3. (Hull 7.10) **15p**

4. Image that you are holding 5,000 shares of stock, currently selling at $40 per share. You are ready to sell the shares but would prefer to put off the sale until next year for tax reasons. If you continue to hold the shares until January, however, you face the risk that the stock will drop in value before year end. You decide to use a collar to limit the downside risk without laying out a good deal of additional funds. January call options with a strike of $45 are selling at $2, and January puts with a strike of $35 are selling at $3. What will be the value of your total portfolio in January (including the proceeds from options) if the stock price ends up at a) $30, b) $40 and c) $50? Compare these proceeds to what you would realize if you would simply continue to hold the shares? Did you accomplish what you planned to with this startegy? (BKM 17.11) **15p**

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