Quiz A: 4/16/12 Name & Time Key

Quiz: Assume you are planning to buy a call option on J.P. Morgan Chase because you believe its stock price will rise through the end of this year. Specifically, you believe that Chase's stock price will rise from its current price of $43 per share to $60 per share by the time September options expire on 9/21/2012 (158 days from today) and to $62 per share by the time December options expire on 12/21/2012 (249 days from today). While you plan to buy a December call with a $50 strike price, you expect to hold it only through the expiration of the September option on 9/21. You have determined that over the past year, the standard deviation of returns related to Chase's assets was 35% and on Chase's stock was 48%. Through 9/21, you estimate that the standard deviation of returns related to Chase will be as follows: Chase's assets = 26%, Chase's stock = 39%, the September call on Chase with a $50 strike price = 58%, and the September put on Chase with a $50 strike price = 62%. And you estimate that through 12/21, the standard deviation of returns related to Chase will be as follows: Chase's assets = 27%, Chase's stock = 40%, the December call on Chase with a $50 strike price = 61%, and the December put on Chase with a $50 strike price = 65%. The return on short-term U.S. Treasuries is less than 1% but varies across maturity as follows: 4/19/2012 = 0.066%; 9/20/2012 = 0.1120%; 12/20/2012= 0.128%, 12/31/2012 = 0.160%. Set up the calculations to determine the value of this call according to the Black-Scholes option pricing model?

Note: Bonus WSJ Questions on back of page

$$+3\ \left(d_1 = \frac{\ln\left(\frac{43^{+4}}{PV(K)}\right)}{^{+2}.4\sqrt{\frac{249}{365}}^{+2}} + \frac{^{+2}.4\sqrt{\frac{249}{365}}^{+2}}{2}\right.\quad (15)$$

$$+2\ \left(d_2 = d_1 - {}^{+2}.4\sqrt{\frac{249}{365}}^{+2}\right.\quad (6)$$

$$+3\ \left(PV(K) = \frac{50^{+8}}{(1.00128^{+8})^{249/365\ +2}}\right.$$

$$+3\ \left(C = 43^{+4}\,(N(d_1)) - PV(K)\,(N(d_2))\right.\quad (7)$$

+1 ($N(d_1)$ + $N(d_2)$ ⇒ look up on table or in Excel

$S = 43$ +8

$K = 50$ +8

$\sigma = .4$ +6

$T = \frac{249}{365}$ +8

$r_f = .00128$ +8