Quiz B for 9:45 Class: 8/1/12　　　　Name ___Key___

Assume you are planning to buy a call on the stock of Mega Bank Inc. that expires two years from today with a strike price of $25. Assume also that Mega's current stock price is $30 and its stock price will increase by 20% or fall by 10% each of the next two years. Finally, assume that the risk-free interest rate equals 3% per year and is not expected to change.

a. Calculate the current value of the call.
b. Assume that instead of buying the call, you construct an equivalent portfolio. Calculate the number of bonds you would need to buy or sell to rebalance your portfolio a year from today if Mega's stock price falls by a year from today.

a. $S_u = 30(1.2) = 36$; $S_d = 30(.9) = 27$

$S_{uu} = 30(1.2)^2 = 43.2$; $S_{ud} = S_{du} = 30(1.2)(.9) = 32.4$; $S_{dd} = 30(.9)^2 = 24.3$

$K = 25$

$C_{uu} = 43.2 - 25 = 18.2$; $C_{ud} = C_{du} = 32.4 - 25 = 7.4$; $C_{dd} = 0$

$t=1$

$\Delta_u = \dfrac{18.2 - 7.4}{43.2 - 32.4} = +1$; $B_u = \dfrac{7.4 - (32.4 \times 1)}{1.03} = -24.272$

$C_u = 36(1) - 24.272 = 11.728$

$\Delta_d = \dfrac{7.4 - 0}{32.4 - 24.3} = +0.9136$; $B_d = \dfrac{0 - 24.3(0.9136)}{1.03} = -21.5543$

$C_d = 27(.9136) - 21.5543 = 3.1133$

$t=0$

$\Delta = \dfrac{11.728 - 3.1133}{36 - 27} = 0.9572$; $B = \dfrac{3.1133 - 27(.9572) - 22.069}{1.03}$

$C = 30(.957) - 22.069 = 6.647$

b. 1) Change in stock $= .9136 - 0.9572 = -0.0436$

⇒ Sell 0.0436 shares for $0.0436(27) = \$1.1772$

+3 (⇒ buy $1.1772 of bonds

or 2) Bond balance if no action $= (-22.069)(1.03) = -22.7311$

⇒ Change in bonds $= -21.553 - (-22.069) = +1.1781$

+3 (⇒ buy $1.1781 of bonds