**Quiz B for 9:45 Class: 08/06/13**

**Key**

**Note:** Answer everything on a per-share basis.

Assume that Dellay Computers has a current stock price of $25 per share and its stock price will rise by $5 or fall by $3 each of the next two years. You would like to build a portfolio today that is equivalent to a put that expires two years from today with a $30 strike price. The risk-free interest rate is 2%.

a. What portfolio today is equivalent to the put?
b. What will it cost today to build this portfolio?
c. How will you need to rebalance your portfolio one year from today if Dellay’s stock price rises next year?

\[
\begin{align*}
S = 25 & \quad \Delta = 1 \\
K = 30 & \quad \Delta = \frac{30 - 25}{30 - 25} = \frac{5}{5} = 1 \\
\Delta_d = \frac{30 - 22}{27 - 19} = \frac{8}{8} = 1 \\
\Delta_u = \frac{30 - 35}{27 - 5} = \frac{-5}{22} = -\frac{5}{22} \\
\end{align*}
\]

\[
\begin{align*}
\Delta_d & = 0.375 \\
\Delta_u & = 5 \cdot (0.375)(-2) = 12.5676 \\
\end{align*}
\]

\[
\begin{align*}
\Delta_u & = 0.375(3.75) + 12.5676 = 1.6177 \\
\Delta_d & = \frac{3 - 11}{27 - 19} = -1 \\
\Delta & = -0.7243 \\
\end{align*}
\]

\[
\begin{align*}
\Delta & = \frac{1.6177 - 0.7243}{1.02^2} = 7.4116 \\
\Delta & = \frac{25}{1.02^2} = 22.8878 \\
\Delta & = \frac{22.8878}{7.4116} = 3.093 shares \\
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\end{align*}
\]

a. Short-sell 0.7243 shares, buy 22.8878 of bonds
b. $4.7812

c. Change in shares = -0.7243 - 3.093 = -3.8176 shares
   \Rightarrow buy 3.8176 shares

\[
\begin{align*}
\text{Change in bonds} & = \text{sell } 0.4779 \text{ of bonds} \\
\text{Calculating} & = 0.4779 \times 30 \\
& = 14.337 \\
& = 22.8878(1.02) \\
\end{align*}
\]