MFE5130 – Financial Derivatives

Class Activity (18-September-2019) (Solution)

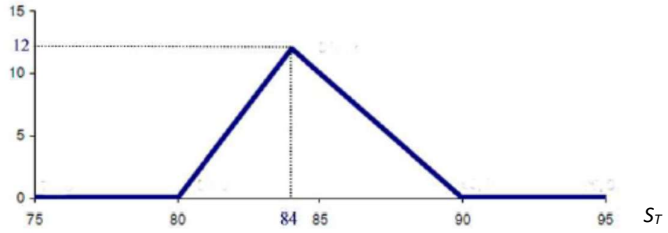
Important Notes:

1. This class activity is counted toward to your class participation score. **Fail** to hand in this class activity worksheet in the class will receive **0 score** for that class.
2. **0 mark** will be received if you leave the solution blank.

Name:	Student No.:

Problem 1

An asymmetric buttery spread has the following payoff diagram:



This position was created using calls that are priced as follows:

Strike Price	Premium
80	4
84	2
90	0.5

What is the cost to establish this asymmetric buttery spread at $t = 0$?

Solution

Using the notations in the lecture notes, we have

$$\lambda = \frac{90-84}{90-80} = 0.6.$$

To construct this asymmetric butterfly, for every 84-strike call we write, we buy 0.6 80-strike call and 0.4 90-strike call. When $S_T = 84$, its payoff is

$$-\max(84-84,0) + 0.6\max(84-80,0) + 0.4\max(84-90,0) = 2.4.$$

From the given payoff diagram, the payoff is 12 when $S_T = 84$. So, the diagram corresponds to write 5 84-strike call, buy 3 80-strike call and 2 90-strike call.

The cost of this asymmetric butterfly spread at $t = 0 = -5\times2 + 3\times4 + 2\times0.5 = 3$.