Adil-Gokturk_HW8.R

HAG

2020-03-30

```
# Adil Gokturk
# FIN 659

# HW8: TRADING STRATEGIES INVOLVING OPTIONS
# Textbook Reference:
# Section 12.3, pp. 256-264;
# See also http://www.theoptionsguide.com/butterfly-spread.aspx,
# http://www.theoptionsguide.com/condor.aspx

# set working directory
setwd("~/Desktop/Spring2020/FIN659/Assignments/hw8")
getwd()
```

```
## [1] "/Users/HAG/Desktop/Spring2020/FIN659/Assignments/hw8"
```

```
# Load the libraries
library(tidyverse)
```

```
## -- Attaching packages ----------------------- tidyverse 1.3.0 --
```

```
## v ggplot2 3.3.0     v purrr   0.3.3
## v tibble  2.1.3     v dplyr   0.8.5
## v tidyr   1.0.2     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.5.0
```

```
## -- Conflicts -------------------------- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(quantmod)
```

```
## Loading required package: xts
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
##
## Attaching package: 'xts'
```

```
## The following objects are masked from 'package:dplyr':
##
##     first, last
```

```
## Loading required package: TTR
```

```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```
## Version 0.4-0 included new data defaults. See ?getSymbols.
```

```
library(optiRum)
library(jrvFinance)
library(knitr)
library(plotly)
```

```
##
## Attaching package: 'plotly'
```

```
## The following object is masked from 'package:ggplot2':
##
##     last_plot
```

```
## The following object is masked from 'package:stats':
##
##     filter
```

```
## The following object is masked from 'package:graphics':
##
##     layout
```

```
options(scipen = 20) # adjust scientific numbers

################
## Problem 1 ##
################

# The key principle to take away from this problem is that
# trading strategies involving options can be constructed
# for many different payoff profiles.

# A condor (or condor spread) trading strategy is similar to
# a butterfly spread - both can be executed with either calls or puts.

# A long butterfly spread using calls involves three strike prices:
# two calls are sold at a middle strike,
# one call is bought above that strike and one call is bought below that strike.
# Thus, a bull call spread is combined with a bear call spread
# with the short calls being at the same strike price.

# A long condor spread also combines a bull call spread with a bear call spread,
# but separates the sold calls by at least one increment.
# Condors have a wider range of profit, but cost more.

# Both spreads are done for a debit
# (meaning that there is an initial cost in setting up the strategy).

# Consider an options trader who sets up a condor trading strategy on
# Boston Scientific Corp. stock.
# The option trader buys a call option with a strike price of $25,
# sells a call option with a strike price of $30,
```

```r
# sells a call option with a strike price of $40,
# and buys a call option with a strike price of $45.

## Complete the table below with the correct formulas
# to show the profit/loss for different values of the stock price
# at the expiration of the options.

#################
## 4 Formulas ##
#################
# Call Options
(call.option <- rep(1:4))
```

```
## [1] 1 2 3 4
```

```r
(strike.price <- c(25, 30, 40, 45))
```

```
## [1] 25 30 40 45
```

```r
(option.price <- c(14.05, 9.70, 3.15, 1.38))
```

```
## [1] 14.05  9.70  3.15  1.38
```

```r
(stock.price <- rep(0:50))
```

```
##  [1]  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
## [26] 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
## [51] 50
```

```r
max(0-25,0) - 14.05
```

```
## [1] -14.05
```

```r
# Calculate call option 1 for all stock prices
call.option1 <- rbind(max(stock.price[1] - strike.price[1],0) - option.price[1],
                      max(stock.price[2] - strike.price[1],0) - option.price[1],
                      max(stock.price[3] - strike.price[1],0) - option.price[1],
                      max(stock.price[4] - strike.price[1],0) - option.price[1],
                      max(stock.price[5] - strike.price[1],0) - option.price[1],
                      max(stock.price[6] - strike.price[1],0) - option.price[1],
                      max(stock.price[7] - strike.price[1],0) - option.price[1],
                      max(stock.price[8] - strike.price[1],0) - option.price[1],
                      max(stock.price[9] - strike.price[1],0) - option.price[1],
                      max(stock.price[10] - strike.price[1],0) - option.price[1],
                      max(stock.price[11] - strike.price[1],0) - option.price[1],
                      max(stock.price[12] - strike.price[1],0) - option.price[1],
                      max(stock.price[13] - strike.price[1],0) - option.price[1],
                      max(stock.price[14] - strike.price[1],0) - option.price[1],
                      max(stock.price[15] - strike.price[1],0) - option.price[1],
                      max(stock.price[16] - strike.price[1],0) - option.price[1],
                      max(stock.price[17] - strike.price[1],0) - option.price[1],
                      max(stock.price[18] - strike.price[1],0) - option.price[1],
                      max(stock.price[19] - strike.price[1],0) - option.price[1],
                      max(stock.price[20] - strike.price[1],0) - option.price[1],
                      max(stock.price[21] - strike.price[1],0) - option.price[1],
                      max(stock.price[22] - strike.price[1],0) - option.price[1],
                      max(stock.price[23] - strike.price[1],0) - option.price[1],
```

```
                      max(stock.price[24] - strike.price[1],0) - option.price[1],
                      max(stock.price[25] - strike.price[1],0) - option.price[1],
                      max(stock.price[26] - strike.price[1],0) - option.price[1],
                      max(stock.price[27] - strike.price[1],0) - option.price[1],
                      max(stock.price[28] - strike.price[1],0) - option.price[1],
                      max(stock.price[29] - strike.price[1],0) - option.price[1],
                      max(stock.price[30] - strike.price[1],0) - option.price[1],
                      max(stock.price[31] - strike.price[1],0) - option.price[1],
                      max(stock.price[32] - strike.price[1],0) - option.price[1],
                      max(stock.price[33] - strike.price[1],0) - option.price[1],
                      max(stock.price[34] - strike.price[1],0) - option.price[1],
                      max(stock.price[35] - strike.price[1],0) - option.price[1],
                      max(stock.price[36] - strike.price[1],0) - option.price[1],
                      max(stock.price[37] - strike.price[1],0) - option.price[1],
                      max(stock.price[38] - strike.price[1],0) - option.price[1],
                      max(stock.price[39] - strike.price[1],0) - option.price[1],
                      max(stock.price[40] - strike.price[1],0) - option.price[1],
                      max(stock.price[41] - strike.price[1],0) - option.price[1],
                      max(stock.price[42] - strike.price[1],0) - option.price[1],
                      max(stock.price[43] - strike.price[1],0) - option.price[1],
                      max(stock.price[44] - strike.price[1],0) - option.price[1],
                      max(stock.price[45] - strike.price[1],0) - option.price[1],
                      max(stock.price[46] - strike.price[1],0) - option.price[1],
                      max(stock.price[47] - strike.price[1],0) - option.price[1],
                      max(stock.price[48] - strike.price[1],0) - option.price[1],
                      max(stock.price[49] - strike.price[1],0) - option.price[1],
                      max(stock.price[50] - strike.price[1],0) - option.price[1],
                      max(stock.price[51] - strike.price[1],0) - option.price[1])

# Calculate call option 2 for all stock prices
call.option2 <- rbind(-(max(stock.price[1] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[2] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[3] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[4] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[5] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[6] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[7] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[8] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[9] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[10] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[11] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[12] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[13] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[14] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[15] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[16] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[17] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[18] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[19] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[20] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[21] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[22] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[23] - strike.price[2],0) - option.price[2]),
```

```
                      -(max(stock.price[24] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[25] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[26] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[27] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[28] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[29] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[30] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[31] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[32] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[33] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[34] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[35] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[36] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[37] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[38] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[39] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[40] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[41] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[42] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[43] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[44] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[45] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[46] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[47] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[48] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[49] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[50] - strike.price[2],0) - option.price[2]),
                      -(max(stock.price[51] - strike.price[2],0) - option.price[2]))

# Calculate call option 3 for all stock prices
call.option3 <- rbind(-(max(stock.price[1] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[2] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[3] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[4] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[5] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[6] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[7] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[8] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[9] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[10] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[11] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[12] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[13] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[14] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[15] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[16] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[17] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[18] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[19] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[20] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[21] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[22] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[23] - strike.price[3],0) - option.price[3]),
```

```
                      -(max(stock.price[24] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[25] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[26] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[27] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[28] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[29] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[30] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[31] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[32] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[33] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[34] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[35] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[36] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[37] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[38] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[39] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[40] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[41] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[42] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[43] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[44] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[45] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[46] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[47] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[48] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[49] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[50] - strike.price[3],0) - option.price[3]),
                      -(max(stock.price[51] - strike.price[3],0) - option.price[3]))


# Calculate call option 4 for all stock prices
call.option4 <- rbind(max(stock.price[1] - strike.price[4],0) - option.price[4],
                      max(stock.price[2] - strike.price[4],0) - option.price[4],
                      max(stock.price[3] - strike.price[4],0) - option.price[4],
                      max(stock.price[4] - strike.price[4],0) - option.price[4],
                      max(stock.price[5] - strike.price[4],0) - option.price[4],
                      max(stock.price[6] - strike.price[4],0) - option.price[4],
                      max(stock.price[7] - strike.price[4],0) - option.price[4],
                      max(stock.price[8] - strike.price[4],0) - option.price[4],
                      max(stock.price[9] - strike.price[4],0) - option.price[4],
                      max(stock.price[10] - strike.price[4],0) - option.price[4],
                      max(stock.price[11] - strike.price[4],0) - option.price[4],
                      max(stock.price[12] - strike.price[4],0) - option.price[4],
                      max(stock.price[13] - strike.price[4],0) - option.price[4],
                      max(stock.price[14] - strike.price[4],0) - option.price[4],
                      max(stock.price[15] - strike.price[4],0) - option.price[4],
                      max(stock.price[16] - strike.price[4],0) - option.price[4],
                      max(stock.price[17] - strike.price[4],0) - option.price[4],
                      max(stock.price[18] - strike.price[4],0) - option.price[4],
                      max(stock.price[19] - strike.price[4],0) - option.price[4],
                      max(stock.price[20] - strike.price[4],0) - option.price[4],
                      max(stock.price[21] - strike.price[4],0) - option.price[4],
                      max(stock.price[22] - strike.price[4],0) - option.price[4],
```

```
                      max(stock.price[23] - strike.price[4],0) - option.price[4],
                      max(stock.price[24] - strike.price[4],0) - option.price[4],
                      max(stock.price[25] - strike.price[4],0) - option.price[4],
                      max(stock.price[26] - strike.price[4],0) - option.price[4],
                      max(stock.price[27] - strike.price[4],0) - option.price[4],
                      max(stock.price[28] - strike.price[4],0) - option.price[4],
                      max(stock.price[29] - strike.price[4],0) - option.price[4],
                      max(stock.price[30] - strike.price[4],0) - option.price[4],
                      max(stock.price[31] - strike.price[4],0) - option.price[4],
                      max(stock.price[32] - strike.price[4],0) - option.price[4],
                      max(stock.price[33] - strike.price[4],0) - option.price[4],
                      max(stock.price[34] - strike.price[4],0) - option.price[4],
                      max(stock.price[35] - strike.price[4],0) - option.price[4],
                      max(stock.price[36] - strike.price[4],0) - option.price[4],
                      max(stock.price[37] - strike.price[4],0) - option.price[4],
                      max(stock.price[38] - strike.price[4],0) - option.price[4],
                      max(stock.price[39] - strike.price[4],0) - option.price[4],
                      max(stock.price[40] - strike.price[4],0) - option.price[4],
                      max(stock.price[41] - strike.price[4],0) - option.price[4],
                      max(stock.price[42] - strike.price[4],0) - option.price[4],
                      max(stock.price[43] - strike.price[4],0) - option.price[4],
                      max(stock.price[44] - strike.price[4],0) - option.price[4],
                      max(stock.price[45] - strike.price[4],0) - option.price[4],
                      max(stock.price[46] - strike.price[4],0) - option.price[4],
                      max(stock.price[47] - strike.price[4],0) - option.price[4],
                      max(stock.price[48] - strike.price[4],0) - option.price[4],
                      max(stock.price[49] - strike.price[4],0) - option.price[4],
                      max(stock.price[50] - strike.price[4],0) - option.price[4],
                      max(stock.price[51] - strike.price[4],0) - option.price[4])

# Let's put all option prices ina data frame
(all.options <- data.frame(call.option1,
                           call.option2,
                           call.option3,
                           call.option4))
```

```
##    call.option1 call.option2 call.option3 call.option4
## 1        -14.05          9.7         3.15        -1.38
## 2        -14.05          9.7         3.15        -1.38
## 3        -14.05          9.7         3.15        -1.38
## 4        -14.05          9.7         3.15        -1.38
## 5        -14.05          9.7         3.15        -1.38
## 6        -14.05          9.7         3.15        -1.38
## 7        -14.05          9.7         3.15        -1.38
## 8        -14.05          9.7         3.15        -1.38
## 9        -14.05          9.7         3.15        -1.38
## 10       -14.05          9.7         3.15        -1.38
## 11       -14.05          9.7         3.15        -1.38
## 12       -14.05          9.7         3.15        -1.38
## 13       -14.05          9.7         3.15        -1.38
## 14       -14.05          9.7         3.15        -1.38
## 15       -14.05          9.7         3.15        -1.38
## 16       -14.05          9.7         3.15        -1.38
## 17       -14.05          9.7         3.15        -1.38
```

```
## 18       -14.05          9.7         3.15        -1.38
## 19       -14.05          9.7         3.15        -1.38
## 20       -14.05          9.7         3.15        -1.38
## 21       -14.05          9.7         3.15        -1.38
## 22       -14.05          9.7         3.15        -1.38
## 23       -14.05          9.7         3.15        -1.38
## 24       -14.05          9.7         3.15        -1.38
## 25       -14.05          9.7         3.15        -1.38
## 26       -14.05          9.7         3.15        -1.38
## 27       -13.05          9.7         3.15        -1.38
## 28       -12.05          9.7         3.15        -1.38
## 29       -11.05          9.7         3.15        -1.38
## 30       -10.05          9.7         3.15        -1.38
## 31        -9.05          9.7         3.15        -1.38
## 32        -8.05          8.7         3.15        -1.38
## 33        -7.05          7.7         3.15        -1.38
## 34        -6.05          6.7         3.15        -1.38
## 35        -5.05          5.7         3.15        -1.38
## 36        -4.05          4.7         3.15        -1.38
## 37        -3.05          3.7         3.15        -1.38
## 38        -2.05          2.7         3.15        -1.38
## 39        -1.05          1.7         3.15        -1.38
## 40        -0.05          0.7         3.15        -1.38
## 41         0.95         -0.3         3.15        -1.38
## 42         1.95         -1.3         2.15        -1.38
## 43         2.95         -2.3         1.15        -1.38
## 44         3.95         -3.3         0.15        -1.38
## 45         4.95         -4.3        -0.85        -1.38
## 46         5.95         -5.3        -1.85        -1.38
## 47         6.95         -6.3        -2.85        -0.38
## 48         7.95         -7.3        -3.85         0.62
## 49         8.95         -8.3        -4.85         1.62
## 50         9.95         -9.3        -5.85         2.62
## 51        10.95        -10.3        -6.85         3.62
```

```r
# Caculate profit and loss
profit.loss <- rbind(sum(all.options[1,]),
                     sum(all.options[2,]),
                     sum(all.options[3,]),
                     sum(all.options[4,]),
                     sum(all.options[5,]),
                     sum(all.options[6,]),
                     sum(all.options[7,]),
                     sum(all.options[8,]),
                     sum(all.options[9,]),
                     sum(all.options[10,]),
                     sum(all.options[11,]),
                     sum(all.options[12,]),
                     sum(all.options[13,]),
                     sum(all.options[14,]),
                     sum(all.options[15,]),
                     sum(all.options[16,]),
                     sum(all.options[17,]),
                     sum(all.options[18,]),
```

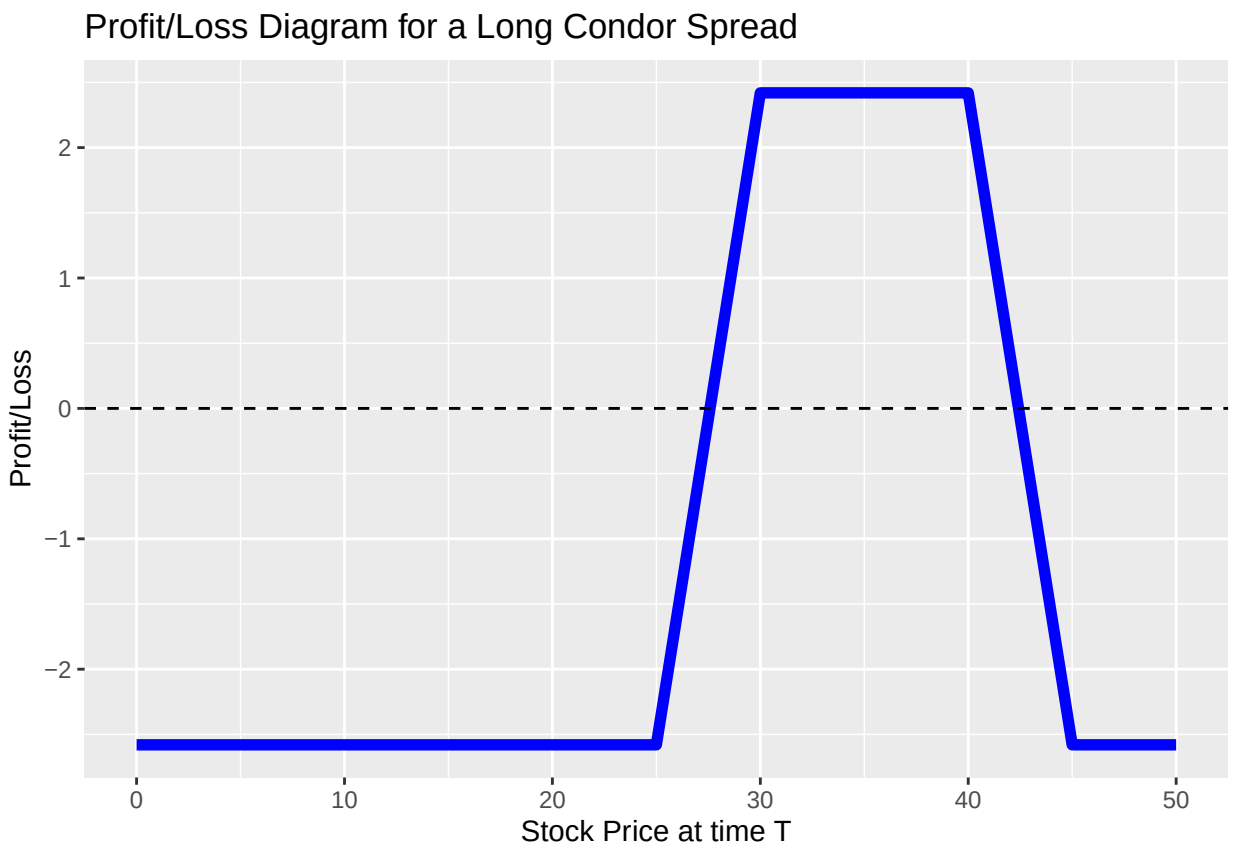
```
                      sum(all.options[19,]),
                      sum(all.options[20,]),
                      sum(all.options[21,]),
                      sum(all.options[22,]),
                      sum(all.options[23,]),
                      sum(all.options[24,]),
                      sum(all.options[25,]),
                      sum(all.options[26,]),
                      sum(all.options[27,]),
                      sum(all.options[28,]),
                      sum(all.options[29,]),
                      sum(all.options[30,]),
                      sum(all.options[31,]),
                      sum(all.options[32,]),
                      sum(all.options[33,]),
                      sum(all.options[34,]),
                      sum(all.options[35,]),
                      sum(all.options[36,]),
                      sum(all.options[37,]),
                      sum(all.options[38,]),
                      sum(all.options[39,]),
                      sum(all.options[40,]),
                      sum(all.options[41,]),
                      sum(all.options[42,]),
                      sum(all.options[43,]),
                      sum(all.options[44,]),
                      sum(all.options[45,]),
                      sum(all.options[46,]),
                      sum(all.options[47,]),
                      sum(all.options[48,]),
                      sum(all.options[49,]),
                      sum(all.options[50,]),
                      sum(all.options[51,]))

# Let's put all the data in a data frame
all.options <- data.frame(stock.price,all.options, profit.loss)

# visualize it
kable(all.options,col.names = c("Stock Price $",
                                "Call Option1 $",
                                "Call Option2 $",
                                "Call Option3 $",
                                "Call Option4 $",
                                "Profit/Loss $"),  align = "c")
```

Stock Price $	Call Option1 $	Call Option2 $	Call Option3 $	Call Option4 $	Profit/Loss $
0	-14.05	9.7	3.15	-1.38	-2.58
1	-14.05	9.7	3.15	-1.38	-2.58
2	-14.05	9.7	3.15	-1.38	-2.58
3	-14.05	9.7	3.15	-1.38	-2.58
4	-14.05	9.7	3.15	-1.38	-2.58
5	-14.05	9.7	3.15	-1.38	-2.58
6	-14.05	9.7	3.15	-1.38	-2.58

Stock Price $	Call Option1 $	Call Option2 $	Call Option3 $	Call Option4 $	Profit/Loss $
7	-14.05	9.7	3.15	-1.38	-2.58
8	-14.05	9.7	3.15	-1.38	-2.58
9	-14.05	9.7	3.15	-1.38	-2.58
10	-14.05	9.7	3.15	-1.38	-2.58
11	-14.05	9.7	3.15	-1.38	-2.58
12	-14.05	9.7	3.15	-1.38	-2.58
13	-14.05	9.7	3.15	-1.38	-2.58
14	-14.05	9.7	3.15	-1.38	-2.58
15	-14.05	9.7	3.15	-1.38	-2.58
16	-14.05	9.7	3.15	-1.38	-2.58
17	-14.05	9.7	3.15	-1.38	-2.58
18	-14.05	9.7	3.15	-1.38	-2.58
19	-14.05	9.7	3.15	-1.38	-2.58
20	-14.05	9.7	3.15	-1.38	-2.58
21	-14.05	9.7	3.15	-1.38	-2.58
22	-14.05	9.7	3.15	-1.38	-2.58
23	-14.05	9.7	3.15	-1.38	-2.58
24	-14.05	9.7	3.15	-1.38	-2.58
25	-14.05	9.7	3.15	-1.38	-2.58
26	-13.05	9.7	3.15	-1.38	-1.58
27	-12.05	9.7	3.15	-1.38	-0.58
28	-11.05	9.7	3.15	-1.38	0.42
29	-10.05	9.7	3.15	-1.38	1.42
30	-9.05	9.7	3.15	-1.38	2.42
31	-8.05	8.7	3.15	-1.38	2.42
32	-7.05	7.7	3.15	-1.38	2.42
33	-6.05	6.7	3.15	-1.38	2.42
34	-5.05	5.7	3.15	-1.38	2.42
35	-4.05	4.7	3.15	-1.38	2.42
36	-3.05	3.7	3.15	-1.38	2.42
37	-2.05	2.7	3.15	-1.38	2.42
38	-1.05	1.7	3.15	-1.38	2.42
39	-0.05	0.7	3.15	-1.38	2.42
40	0.95	-0.3	3.15	-1.38	2.42
41	1.95	-1.3	2.15	-1.38	1.42
42	2.95	-2.3	1.15	-1.38	0.42
43	3.95	-3.3	0.15	-1.38	-0.58
44	4.95	-4.3	-0.85	-1.38	-1.58
45	5.95	-5.3	-1.85	-1.38	-2.58
46	6.95	-6.3	-2.85	-0.38	-2.58
47	7.95	-7.3	-3.85	0.62	-2.58
48	8.95	-8.3	-4.85	1.62	-2.58
49	9.95	-9.3	-5.85	2.62	-2.58
50	10.95	-10.3	-6.85	3.62	-2.58

```
# Let's plot an interactive plot for
# the  Profit/Loss Diagram for a Long Condor Spread
options.plot <- ggplot(data = all.options, aes(y = profit.loss, x = stock.price)) + geom_line(color="blu
  geom_hline(yintercept = 0, lty = 2) +
  xlab("Stock Price at time T") +
  ylab("Profit/Loss") +
  ggtitle("Profit/Loss Diagram for a Long Condor Spread")
```

```
#Static Plot
options.plot
```




```
# interactive plot
#ggplotly(options.plot)
```