For the first long assignment each group will code a User Defined Function to value the franchise of the iPhone. In the attached spreadsheet you can notice that ~55% of Apple's business value comes from its iPhone franchise and there are three pressure points that will test this value:

* Apple's capacity to maintain pricing power and earn its current margins; there isn't a competitor within shouting distance of Apple, when it comes to margins. If the after-tax margin drops to 15% from its current 21%, the value of the franchise drops to $219 billion.
* Apple may be able to prevent the life cycle from speeding up further and that it can continue to innovate at a reasonable cost (with this cost in conjunction with the loss in earnings during the second part of the cycle not exceeding 50% of the after-tax earnings during the period). Reducing the life cycle to one year from two almost halves the value of the franchise.
* Apple is able to maintain a net positive switching ratio (more of the competitors' customers switch to Apple than vice versa), allowing it to increase in market share in dollar value terms. Assuming a neutral switching ratio (customers switching in = customers switching out), reduces the value of the franchise to $255 billion.

There is an internal tension between these *three* variables, since keeping iPhone prices high (preserving the high margins) and spending less on innovation (reducing the cost of innovation) may increase the risk that more customers will switch away than into the iPhone. Using the "life cycle" variable also provides some perspective on why the lawsuit victory against Samsung may have a bigger effect on the value of the iPhone franchise than how the iPhone 5 fares with customers in a few weeks. *Samsung's loss will have a deterrent effect on competitors planning an assault on the iPhone kingdom, thus increasing Apple's pricing power (preserving margins) and improving its odds of holding on to its customers (improving its switching ratio).*

With the iPod, iPhone and iPad, the company has been able to count on the unmatched loyalty of its customers, while both attracting customers of less innovative competitors and increasing overall market size. The question that investors face right now is whether Apple can continue its winning streak. It seems that low valuation attached to the company RIGHT now assumes that the winning streak may be broken. But unlike other large market cap companies with long product life cycles or diversified product portfolios, Apple’s value rests on being a Phoenix, constantly reinventing itself every few years.

**Requirements for the assignment:**

1. The output of your function must be a two-dimension array. It has to be declared with 0 to NROWS and 1 to NCOLUMNS. Row 0 is where you will insert your headings.
2. You will have to assign a string variable (HEADINGS\_STR) with the following headings, separated by commas.

|  |  |
| --- | --- |
| 1. TOTAL MARKET | 1. ANNUAL GROWTH RATE IN MARKET |
| 1. MARKET SHARE | 1. CURRENT AFTER-TAX OPERATING MARGIN |
| 1. PRODUCT LIFE CYCLE | 1. PERCENT OF OWN CUSTOMERS LOST TO COMPETITORS |
| 1. PERTCENT OF COMPETITORS CUSTOMERS GAINED | 1. COST OF INNOVATION |
| 1. COST OF CAPITAL | 1. RISKFREE RATE |
| 1. YEARS | 1. BASE YEAR REVENUES |
| 1. BASE YEAR AFTER-TAX OPERATING INCOME | 1. REVENUES IN YEAR T |
| 1. MARKET SHARE IN YEAR T | 1. VALUE OF IPHONE FRANCHISE |
| 1. EV/SALES | 1. EV/AFTER-TAX OPERATING INCOME |

1. To insert the headings in row 0 of the array you will have to split the HEADINGS\_STR by using the InStr and the Mid functions (review Class Material for Lecture 2 & 3 for guidance).
2. Instead of creating a new matrix for extracting the revenues in year *t* and market share in year *t (for scenario 1 and 2 the calculations are presented on range T7:AC46, AE7:AN46),* each group will have to code the function in such a way that it calls itself; passing the inputs for each scenario to the current iteration of the procedure (see http://www.cpearson.com/excel/recursiveprogramming.aspx). For the calculations of each scenario uses GoSub to call a CALC\_LINE within your function. Remember that the *Return* statement at the end of the CALC\_LINE causes the execution to resume at the statement immediately following the GoSub statement (see <http://msdn.microsoft.com/en-us/library/office/gg251648.aspx>).
3. For passing the parameters to the function call you will first assign the value of each input to a variable and pass that variable to the function itself (*remember to declare each variable with the appropriate data type*):

For the TOTAL\_MARKET\_RNG input:

TOTAL\_MARKET\_VAL = TOTAL\_MARKET\_VECTOR(i, 1)

See the code for the function GROWTH\_SCALER\_FUNC on Lecture 3 for guidance. You will set up the IF Statement and make the initial call to the recursive procedure only if NROWS > 1, and the recursive procedure calls itself N times (N=No. scenarios). Otherwise your function should just assign each parameter to a variable and call the CALC\_LINE to do the proper calculations.

1. Add a Button (Form Control) that prints output on a new Worksheet.
2. Write a detailed technical report explaining the logic behind your function. In the report you will have to explain why **it is inefficient** to call the function itself if you are using the GoSub statement. Added bonus for the group who submit a second function without the recursive procedure -> minimum changes are required.

Christopher Gilpin from Apple in Cupertino California will be reviewing your work and he will be a guest for Lecture 7, you will also have to submit a valuation report on the iPhone Franchise (see comments in the spreadsheet for guidance). Feel free to use the GROWTH\_SCALER\_FUNC from Lecture 3 to estimate the market share based on your research.

If you have questions regarding the assignment email Chris: *chrisgilpin@gmail.com*, **and avoid asking him questions regarding whether or not Apple is undervalued.**