

## Lab Exercise 1

**Objective:** Build a calculator using Interface Builder, the Application Kit, and a skeleton calculator object.

### Required files:

<code>Calculator.m</code>	Contains implementation for the Calculator class (incomplete)
<code>Calculator.h</code>	Contains interface for the Calculator class
<code>Calc.nib</code>	User interface data (incomplete)
<code>Calc_main.m</code>	Contains the main program to run the application (generated by Interface Builder)
<code>Makefile</code>	Creates the application via the "make" command (also generated by Interface Builder)
<code>IB.proj</code>	Project specification for your application (contains info to generate <code>Makefile</code> , etc)
<code>Solution/</code>	Directory containing one possible solution

### Tasks:

1. Study provided files to understand how they work and the initial methods available to you.
2. Double-click on `Calc.nib` to open Interface Builder, and build a calculator user interface:
  - a. Build the calculator interface. First create a window, then bring in buttons for the keypad and a `TextField` (not a `Field`) for the display.
  - b. Use the Inspector window's `Attributes` mode to set each digit button's tag to be equal to the digit. Also inspect the window to set its title and get rid of its buttons.
  - c. The `Calc.nib` file already contains an instance of the Calculator class (named `CalculatorInstance`, visible in the lower left corner of the screen). Connect each button to this instance, selecting the appropriate actions in the Inspector window. To form a connection, you need to first hold the control key down, then click on the source and drag a line to the target. Then select the appropriate action in the `Actions` column of the Inspector window and click `Connect`.
  - d. Finally connect the outlets of `CalculatorInstance`. Form a connection from the object to your outlet, then select the appropriate outlet name in the `Outlets` column of the Inspector window and click `Connect`. Connect the outlets (named `aWindow` and `viewer`) to your main window and the text field, respectively.
  - e. Remember to save your interface file. The project file (`IB.proj`), `Makefile`, and main program file (`Calc_main.m`) have been provided for you; all you need to do is select `Save` to save the `.nib` file.
3. Compile the application (type `make debug` in a Shell or Terminal, or, better yet, select `Make` from `File` menu of Interface Builder). Then run your program (type `Calc` in a Shell or Terminal or double-click on the application icon in a Workspace window). Digits, add, enter, and clear should work. If not, back to step 2.
4. To make other buttons work, add missing code to `Calculator.m`, add necessary methods in the Inspector window, and associate the buttons with the methods.

5. [Optional] Fill in the `stackError:` method. Add any corequisite code to other methods.
6. [Optional] Customize calculator to your taste, and add additional functions. Suggestions:  $1/x$ ,  $\log$ ,  $\ln$ ,  $\sin$ ,  $\cos$ ,  $\tan$ ,  $\sqrt{x}$ ,  $y^x$ ,  $\exp$ . (If unfamiliar with the UNIX math library, check out the manual page for `math.°`)