# Computer Graphics - 234325

# Winter 2015/2016

# Hw1 – Introduction to MFC

**Release Date: 22/10/2015**

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The goal of this exercise is to get you familiar with MFC, which is the graphical user interface that will be used through all the exercises in this course.

Let $w$ and $h$ be the width and height of the application client window. You are required to build a simple MFC application that will help investigating the behavior of the following function, when rasterized:

$$f(x,y) = \sin\frac{\left(a\left(x-\frac{w}{2}\right)\right)^2 + \left(b\left(y-\frac{h}{2}\right)\right)^2}{s}$$

Where $s$ is some scaling factor (default to $w/10$), and $a$, $b$ are positive numbers (default to 1). The application should support visualization modes that reflect the behavior of the function.

The application main window view is treated as the coordinates system, where the center of the window is the origin, and each pixel is one unit in each direction.

The application should support two visualization modes:

1) Continuous color coded function values:

In this mode the values of the function are mapped to the color range between two colors $C_1$ and $C_2$ that are specified by the user, the color $C(x,y)$ of a pixel at $(x,y)$ is:

$$C(x,y) = C_1 * (1-t) + C_2 * t$$

where

$$t = \frac{f(x,y)+1}{2}$$

2) Discrete color as $C(x,y) = f(x,y) > 0\ ?\ C_1 : C_2$.

**You need to implement the following:**

1) Create a single document MFC application
2) Add a custom parameters dialog that controls the following parameters:
   a. *a, b* and *s* parameters of the function

      Add an edit box with appropriate caption, make sure that only positive numbers are allowed.

      Again, the default value of *s* is (screen width / 10), and 1 for *a* and *b*.

   b. $C_1$ and $C_2$ colors:

      Add two buttons, one for each color; pressing each button will open the default colors dialog (`CColorDialog`) for choosing $C_1$ or $C_2$ color.

      The default value are:

      $C_1$ – black (RGB(0,0,0))

      $C_2$ – White (RGB(255,255,255))

3) Add a new button in the toolbar that opens the above dialog.

4) Add a menu item "Mode", with two menu items, "Values" and "Zeros" for the two visualization modes, one of them is checked at a time, add an event handler for both menu items that changes the visualization mode.

The selected mode should be indicated in the menu by a check mark next to the appropriate menu item. To do this you need to add an UPDATE_COMMAND_UI handler to both menu items, this will create a new function with a pointer to CCmdUI class which handles the way the menu item is displayed, for more information search the MSDN/Net.

5) Override the OnDraw method on the view class and implement it to render the function in the selected visualization mode using the current colors and *a*,*b*,s parameters. Use the following methods:

   GetClientRect – for retrieving the view window width and height.
   SetPixel(*x*,*y*,*c*) – A method of the device context that sets the color of pixel (*x*,*y*) to *c*. *c* is of type COLORREF, use the RGB(r,g,b) macro to convert between three rgb color components (each component ranges from 0 to 255) to COLORREF type.

Change the value of *s* and see how it affects the visualization, can you explain it ? Is there any unexpected behavior for small /big values or *s* ?

## General Notes:

- Please check the FAQ section in the course website before you send your questions.
- For MFC questions, please ask Google before you send your questions, we expect you to be able to handle MFC issues by searching the net and MSDN help.
- You are required to use Visual Studio 2012 or Visual Studio 2013.
- Submit electronically a single zip file, named <ID1>_<ID2>_HW1.zip, where ID1 and ID2 are your id numbers. The file should contain the following:
  1. A readme.txt file which contains your names, ids and emails.
  2. The whole homework project with the solution files (VS2012/2013), don't include the intermediate and compilation file in the Release and

Debug folders.

- Frontal submission will held with the homework checker in pairs, make sure your code compiles and runs from different directories.
- Late submission should be coordinated with Fady, a penalty of 3 points will apply for each day of delay.

## Good luck and enjoy!