Preparatory Course in Computing
Summer, 2020
NEWMAT Instructions

1 Visual Studio 2010

The later versions of Visual Studio have a slightly different "look-and-feel" in terms of their window-layout etc. I trust you can work through it without much hand-holding. Contact the TA (and then me) if you are unable to proceed. Part of the computing experience is developing a stomach for software-installation ☺.

1. Download NEWMAT tar or zip file from here, and untar/unzip it. I would pick newmat11, as it has a few advanced-features that may be useful.
2. Open Microsoft Visual Studio 2010[1]
3. You will now create a *static library* using the following steps.
   (a) From the **File** menu, select **New** and the **Project** (cf. figure 1).
   (b) On the **Project Types** pane, under **Visual C++**, select **Win32**.
   (c) On the **Templates** pane, select **Win32 Console Application** (cf. figure 2).
   (d) Choose a name for the project, call it **newmat_library**. Click **OK**.
   (e) If you get the **Overview** page of the **Win32 Application Wizard**, click on the **Next>** button.
   (f) On the **Application Settings** page of the **Win32 Application Wizard**, under **Application type**, select **Static library**.
   (g) Uncheck the **Precompiled header** box.
   (h) Click **Finish**. You should have a screen that looks like figure 3.
4. After all this, your screen should look something like what is shown in figure 4
5. Move your mouse over to the left-side of the screen such that it sits right on top of the icon that says **newmat_library** (cf. figure 5, to have a better idea of what I am talking about). Click the left-button on mouse, you should get a pull-down menu that looks like the first-set of menu-items in figure 5. Move your mouse down to the menu-item that says **Add**. If you waited a second, you will get the second-set of menu-items as shown in figure 5. Select **Existing Item** (cf. figure 5).

[1] You can get it for free as a UIUC student from here, after you logged in using your user-id.

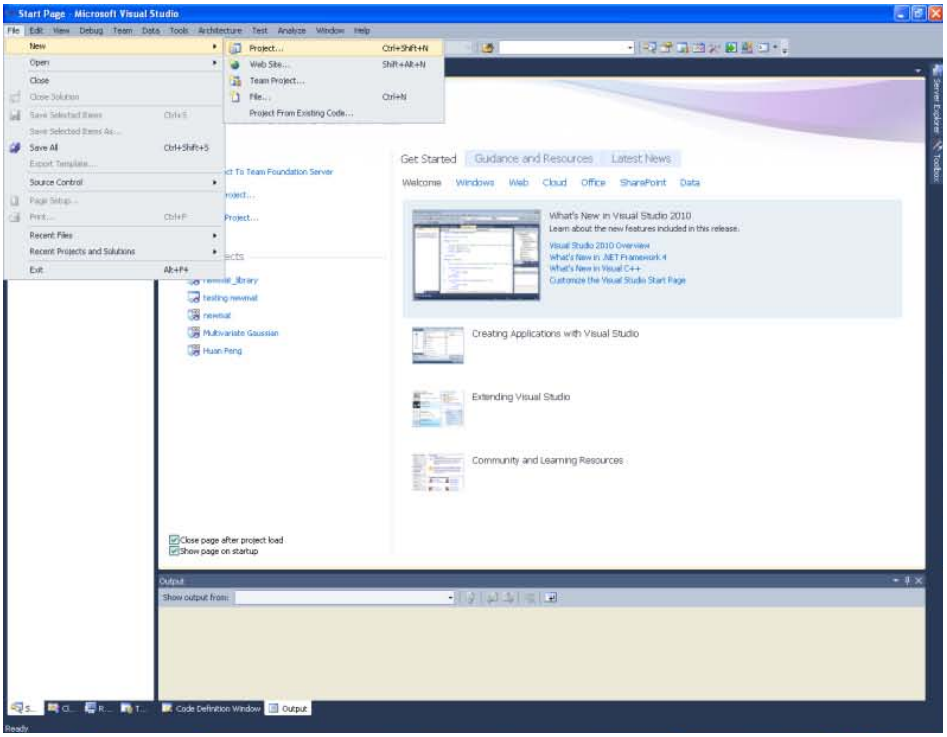

Figure 1: Screenshot of step 3a.

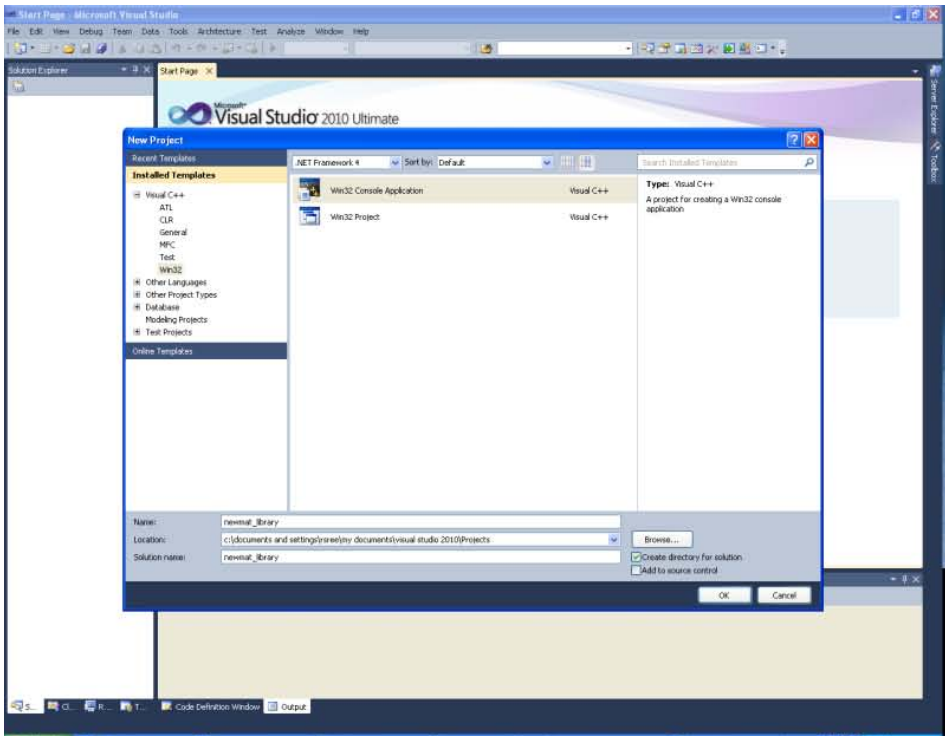

Figure 2: Screenshot of step 3c.

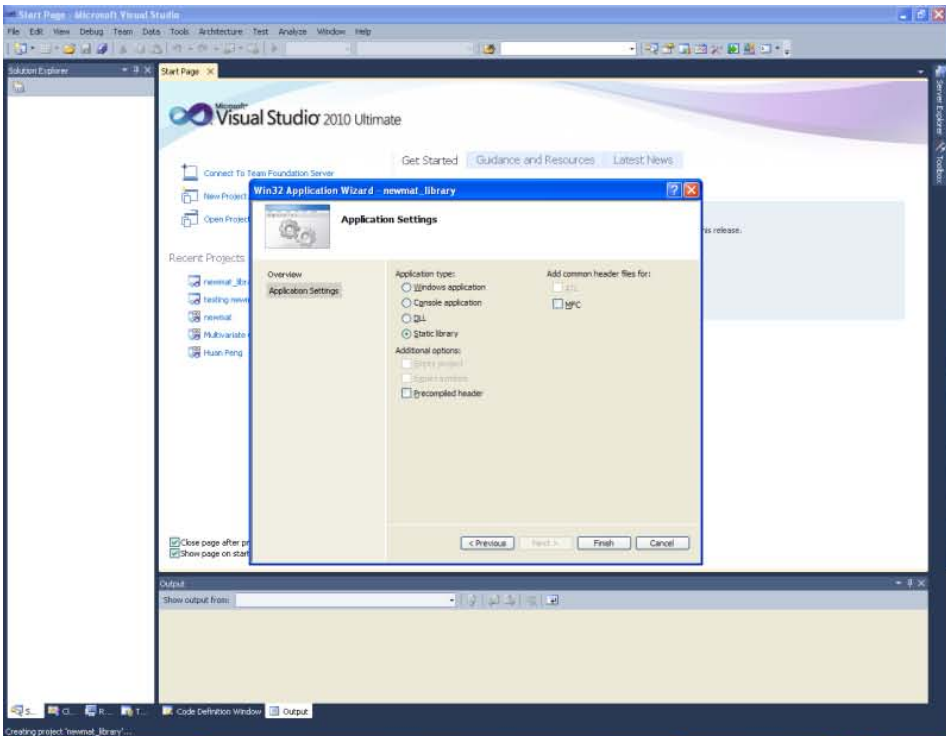

Figure 3: Screenshot at the end of step 3h.

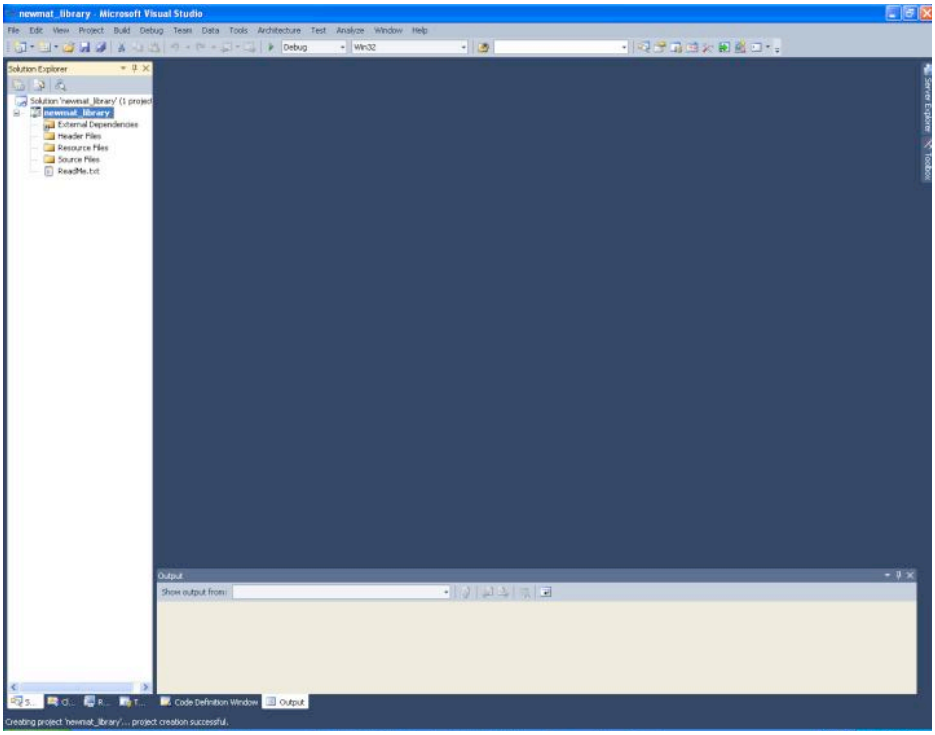

Figure 4: Screenshot at the end of step 4.

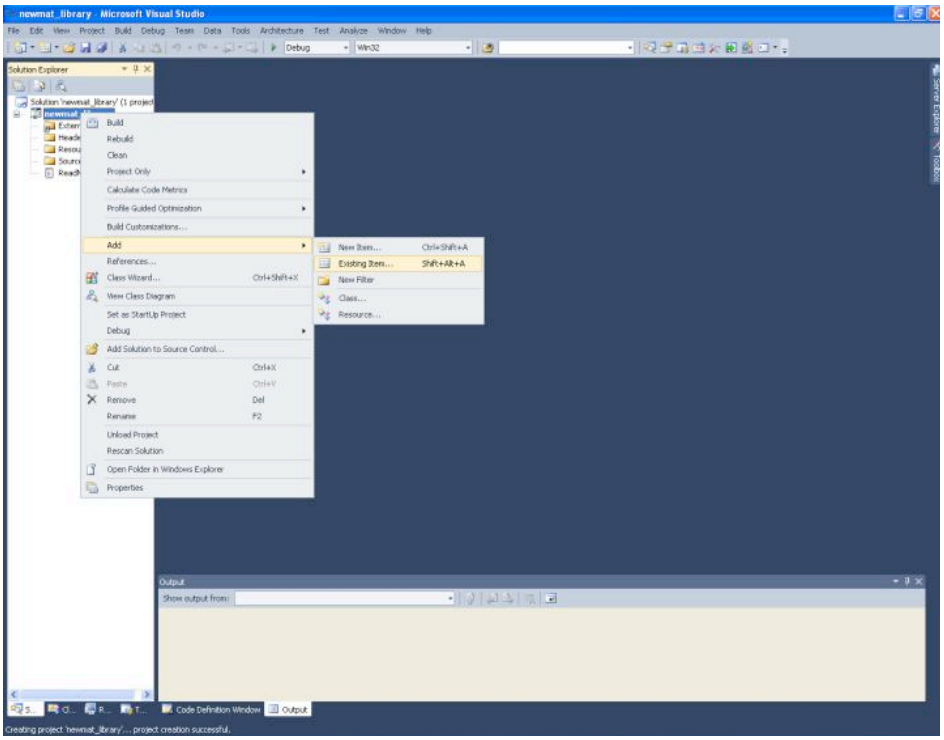

Figure 5: Screenshot to help with step 5.

6. Select Desktop on the left-hand side of the menu and navigate through the directory structure till you get to the directory where you downloaded and unzipped the NEWMAT library. In my case it is in a folder called newmat10 (hard to read/see in figure 6). You should get a screen that looks like what is shown in figure 6.

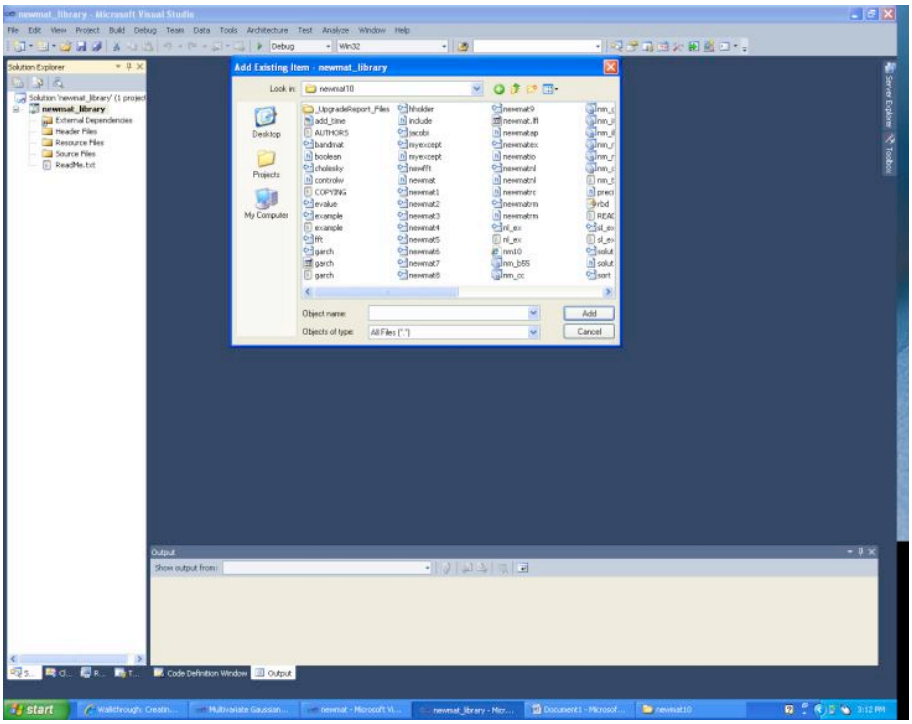

Figure 6: Screenshot relevant to step 6.

7. (Using your **Cntrl** button) You pick/select the following files: *bandmat.cpp, boolean.h, cholesky.cpp, control2.h, evalue.cpp, fft.cpp, hholder.cpp, include.h, jacobi.cpp, myexcept.cpp, myexcept.h, newfft.cpp*, all *newmat*.** files (except *newmat.lft*), *precisio.h, solution.cpp, solution.h, sort.cpp, submat.cpp*, and *svd.cpp* files. Your screen should look something like what is shown in figure 7.

8. Click **Add**. Your screen should look something like what is shown in figure 8. Wait a few seconds till Visual Studio is done scanning the required include files etc. You should see a **Ready** in the bottom left-hand-side of the screen (just above the Windows **Start** button).

9. Move your mouse over to the left-side of the screen such that it sits right on top of the icon that says **newmat_library**. Click the left-button of

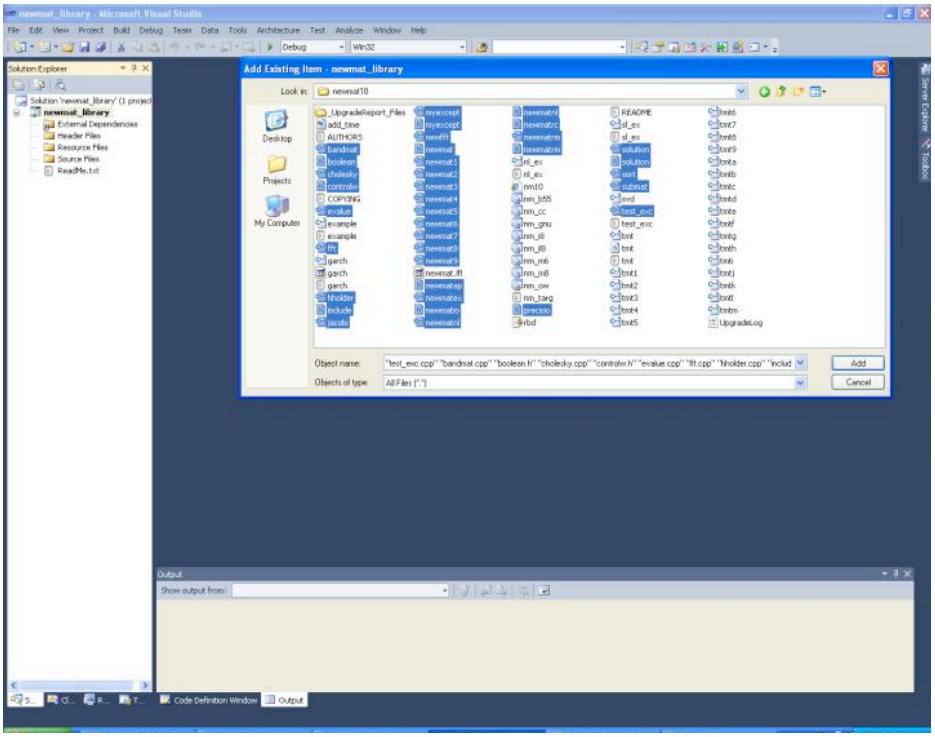

Figure 7: Screenshot relevant to step 7.

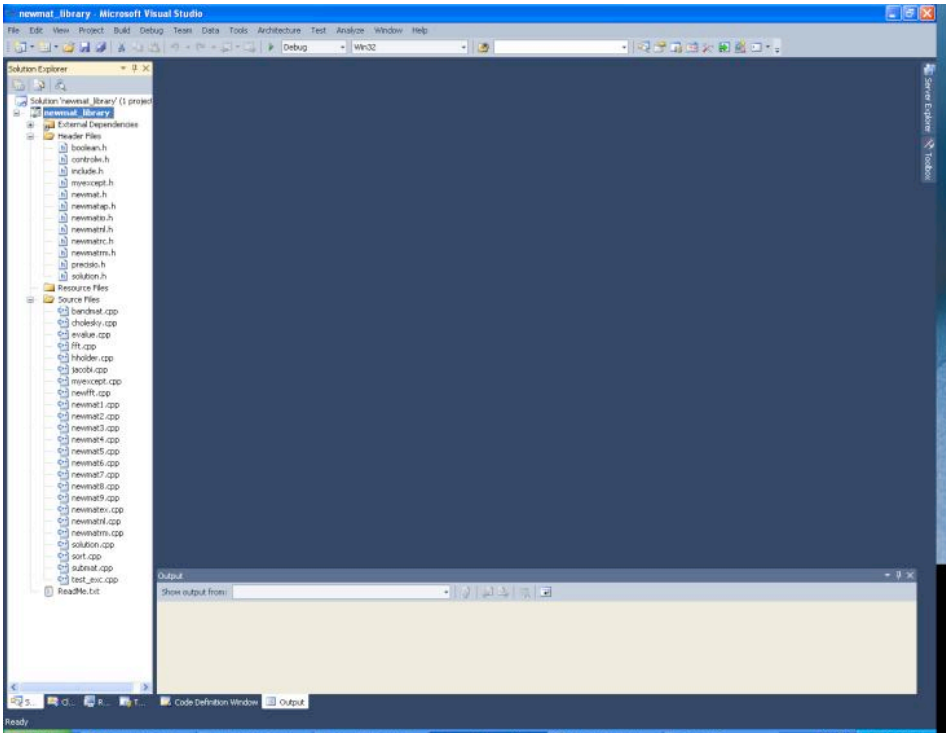

Figure 8: Screenshot relevant to step 8.

the mouse. You will get a pull-down menu that looks like what is shown in figure 9. Select **Build** (as shown in figure 9).

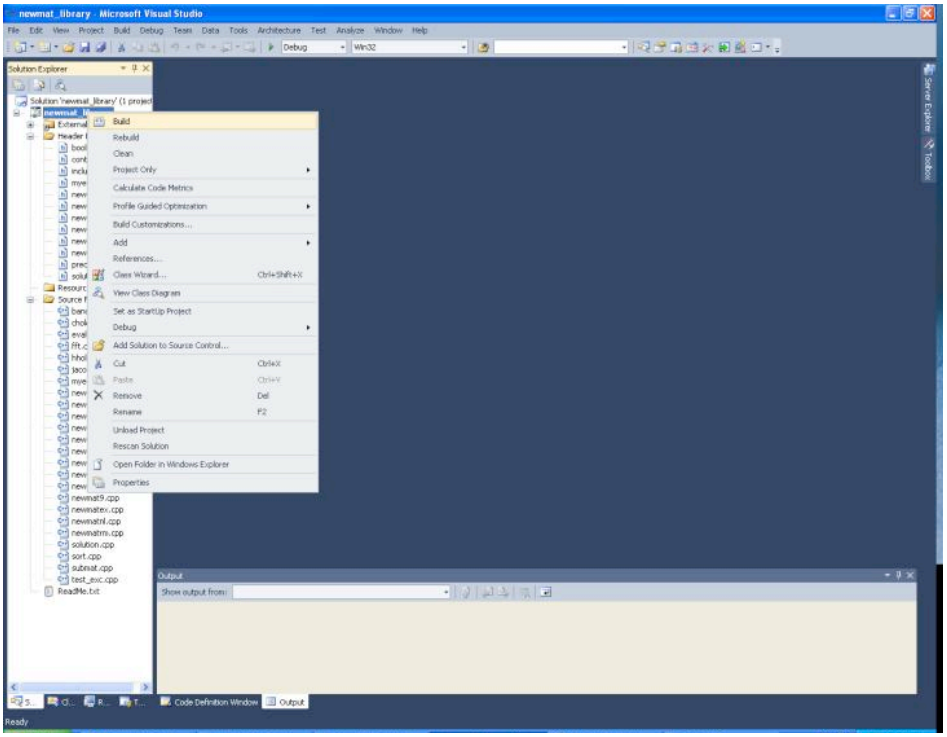

Figure 9: Screenshot relevant to step 9.

10. You should get a screen that looks like what is shown in figure 10. Make sure the last line of the Output window (bottom window, just above the windows taskbar) says
    ========= Build: 1 succeeded, 0 failed, 0 up-to-date, 0 skipped ========
    Fix any errors you might see (most common error is that you have not included stdafx.cpp or stdafx.h). You are now ready to use the NEWMAT library in your C++ code.

1.1 Sample Code

For this part I am going to compile example.cpp that came with the NEWMAT library.

1. Open Visual Studio. Select **File**, and then select **New**, followed by **Project**. PIck **Win32** from the left-hand-side menu, and **Win32 Console Application** from the right-hand-side menu. You then have to enter a name for the project – I picked **Testing Newmat** for mine. You should

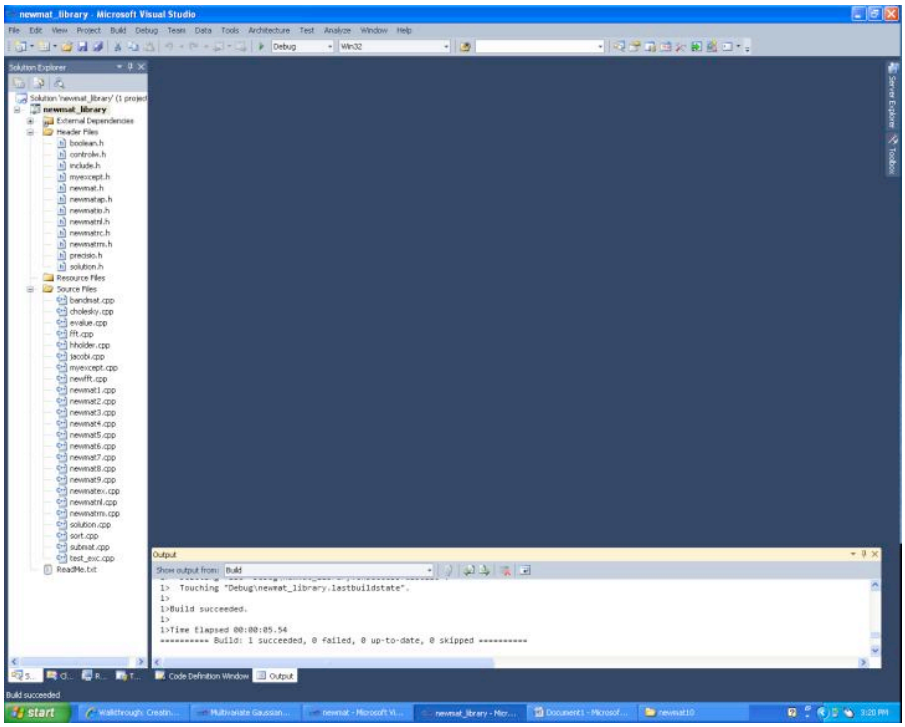

Figure 10: Screenshot relevant to step 10.

have a screen that looks like figure 11 before you click OK. And, after you click OK, you should have a screen that looks like what is shown in figure 12. I usually click on **Next**, and unclick the Precompiled Header box (cf. figure 13). Click **Finish**.

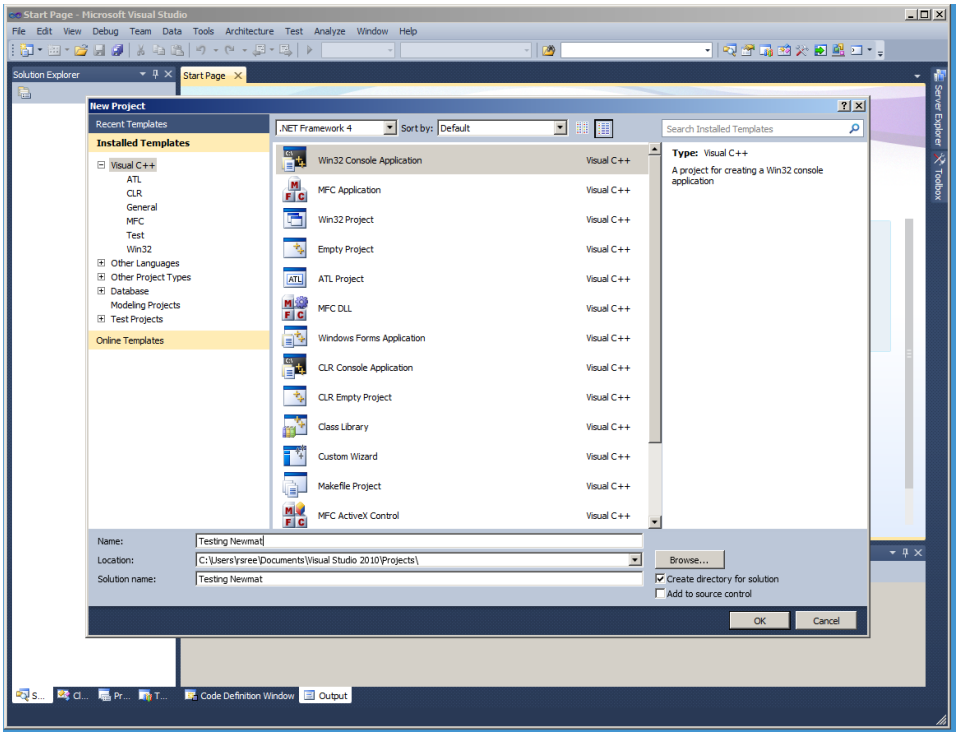

Figure 11: Screenshot relevant to step 1.

2. In this part you are going to tell Visual Studio where the various *.h files are located on your computer. For this, you will move your mouse over to the icon that says **Testing Newmat** on the left-hand window-pane. Click the left mouse button, pick **Properties** f rom the first drop-down menu (cf. figure 14). In the window that props up you will select **VC++ Directories** (cf. figure 15). Select the **Include Directories** menu item (cf. figure 16), and click on the "*¡Edit¿*" button. You will get the screen shown in figure 17. Click the Folder button, and you will get the screen shown in figure 18. Click the ... button, and navigate to the directory where you stored all the Newmat files (cf. figure 19) and click OK, till you get to the screen shown in figure 15.

3. I am not 100% sure you need this step[2]. But it would not hurt to tell the compiler where you have stored the NEWMAT library file that you created

[2]I am a MAC user, not a Windows person!

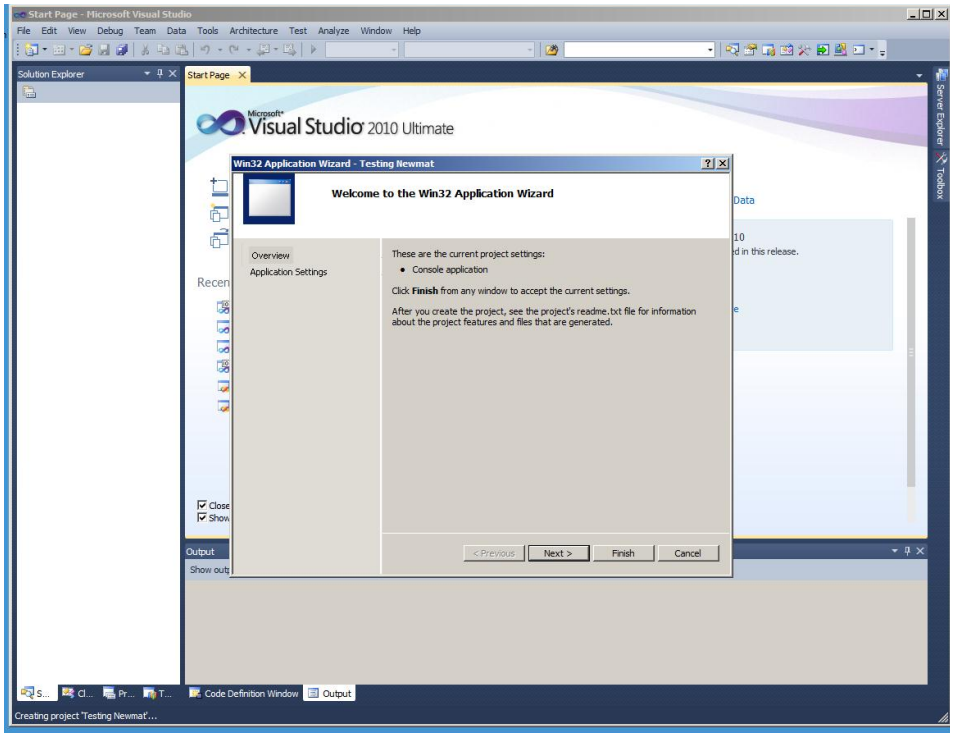

Figure 12: Screenshot relevant to step 1.

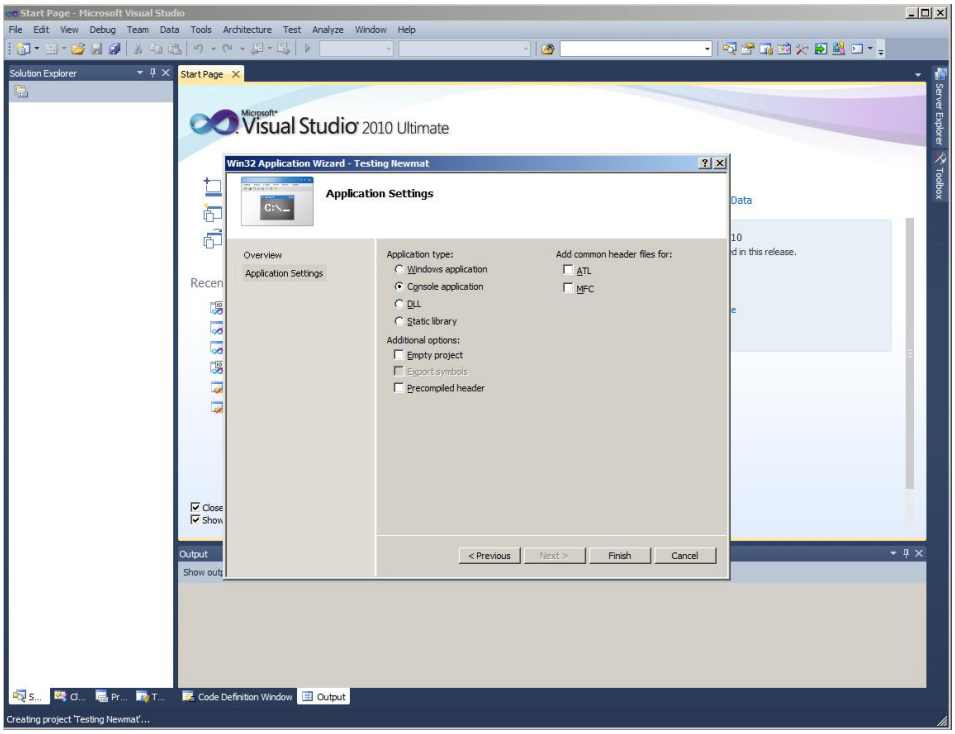

Figure 13: Screenshot relevant to step 1.

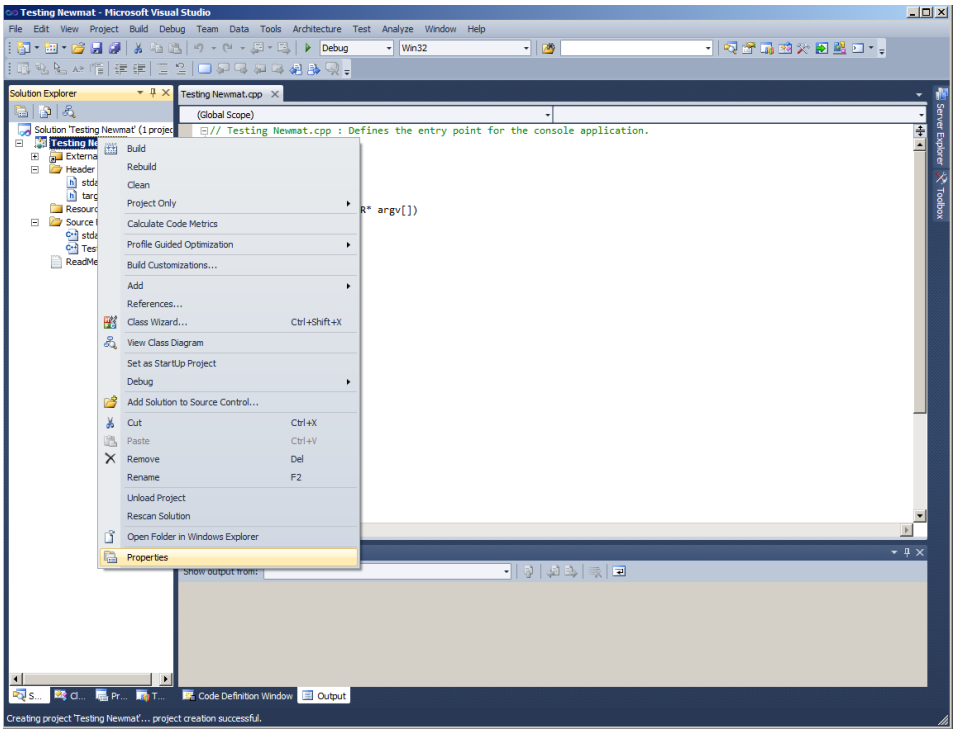

Figure 14: Screenshot relevant to step 2.

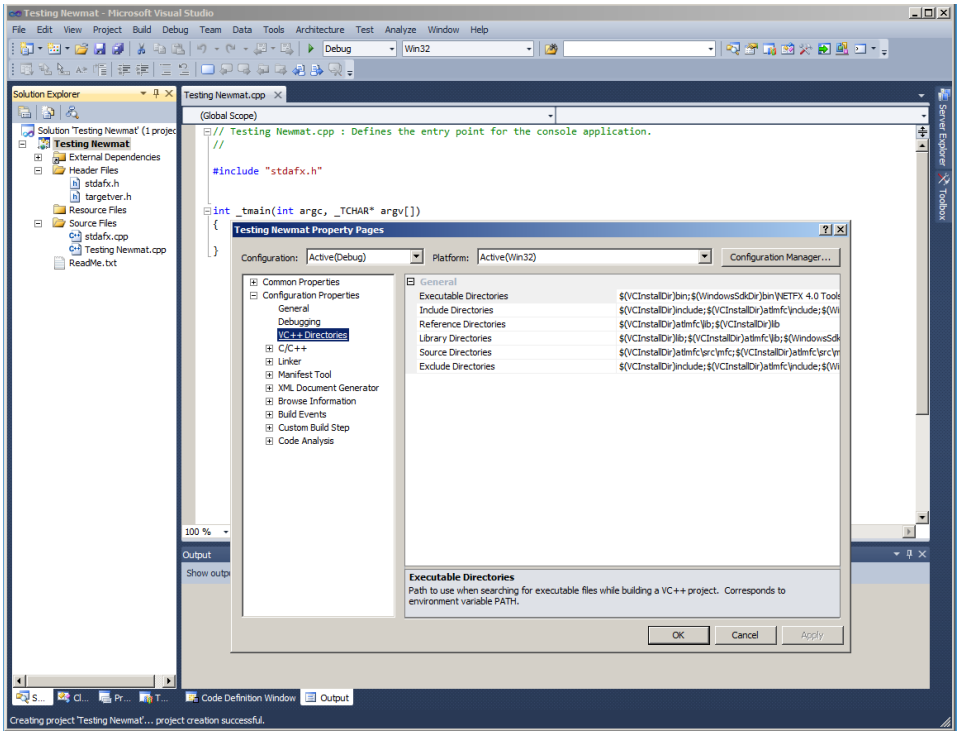

Figure 15: Screenshot relevant to step 2.

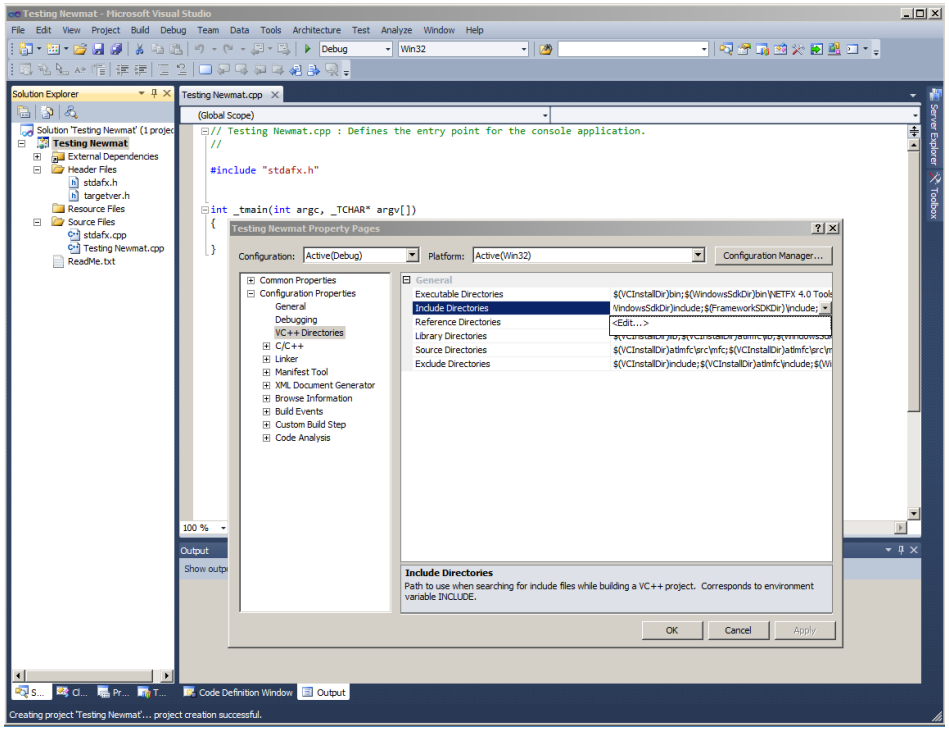

Figure 16: Screenshot relevant to step 2.

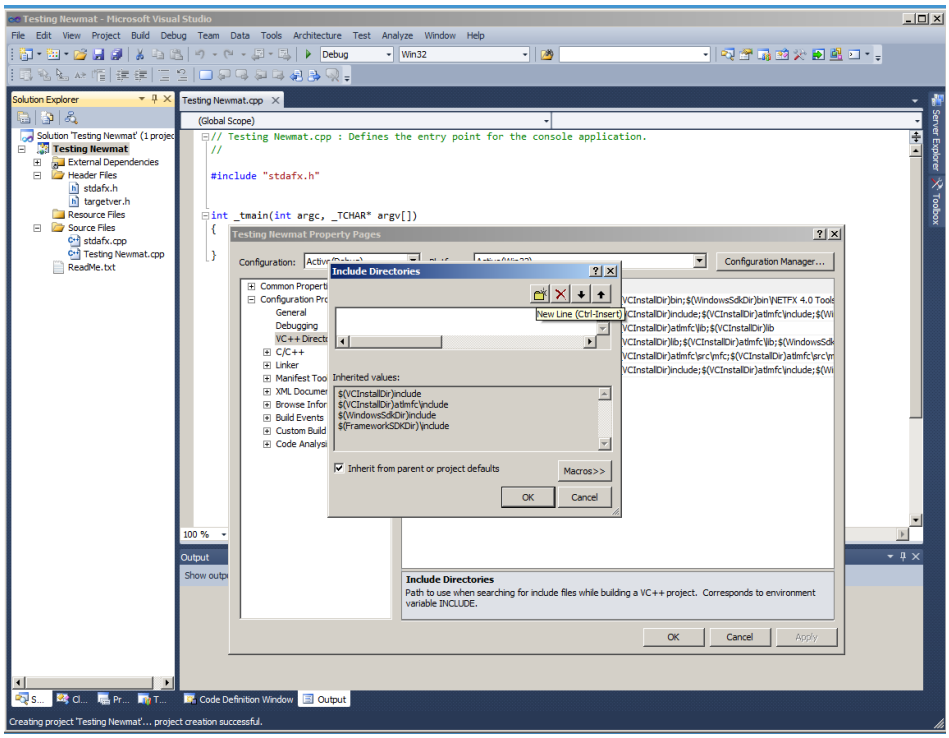

Figure 17: Screenshot relevant to step 2.

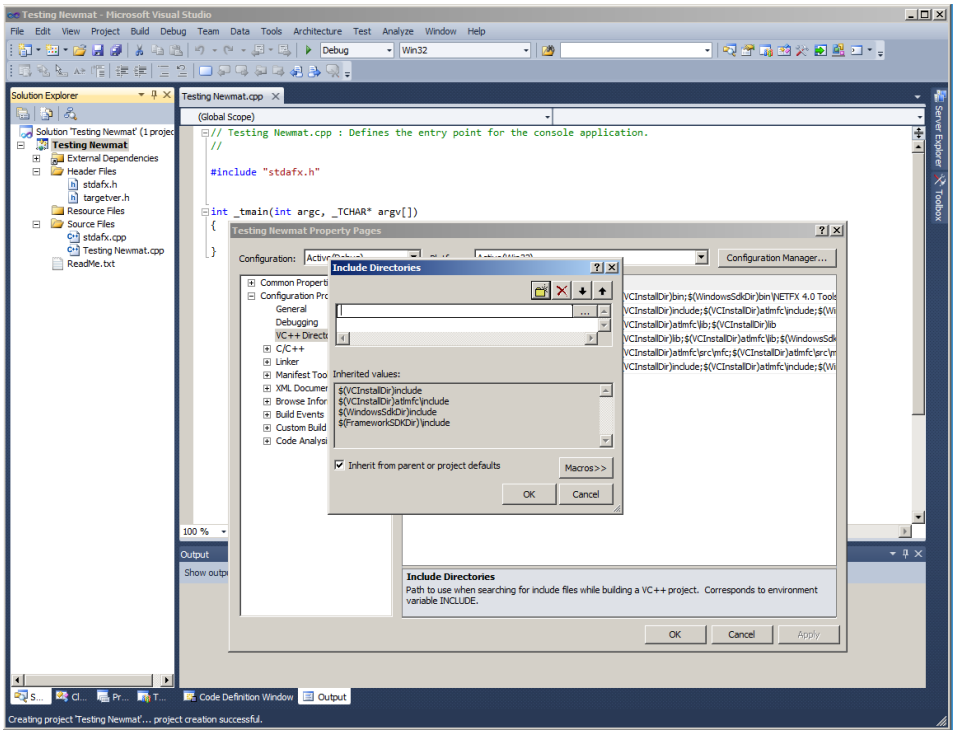

Figure 18: Screenshot relevant to step 2.

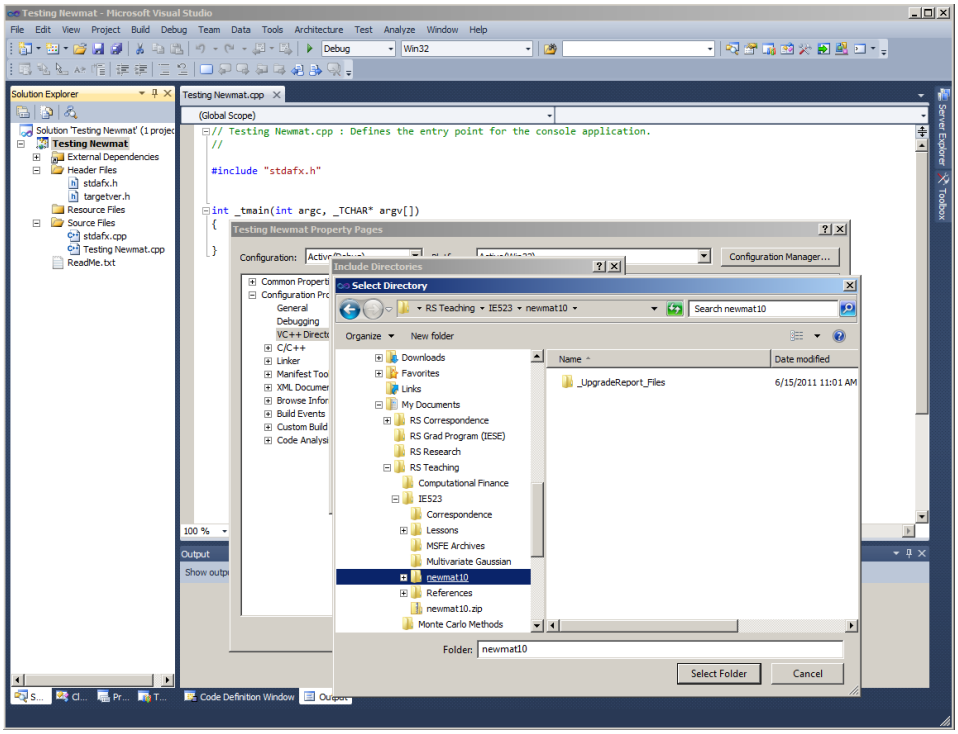

Figure 19: Screenshot relevant to step 2.

in the previous section. For this you will click on **Library Directories** (cf. figure 20). Go through similar steps as before (cf. figure 21 followed by figure 22) where you identify the directory that contains the NEWMAT library file.

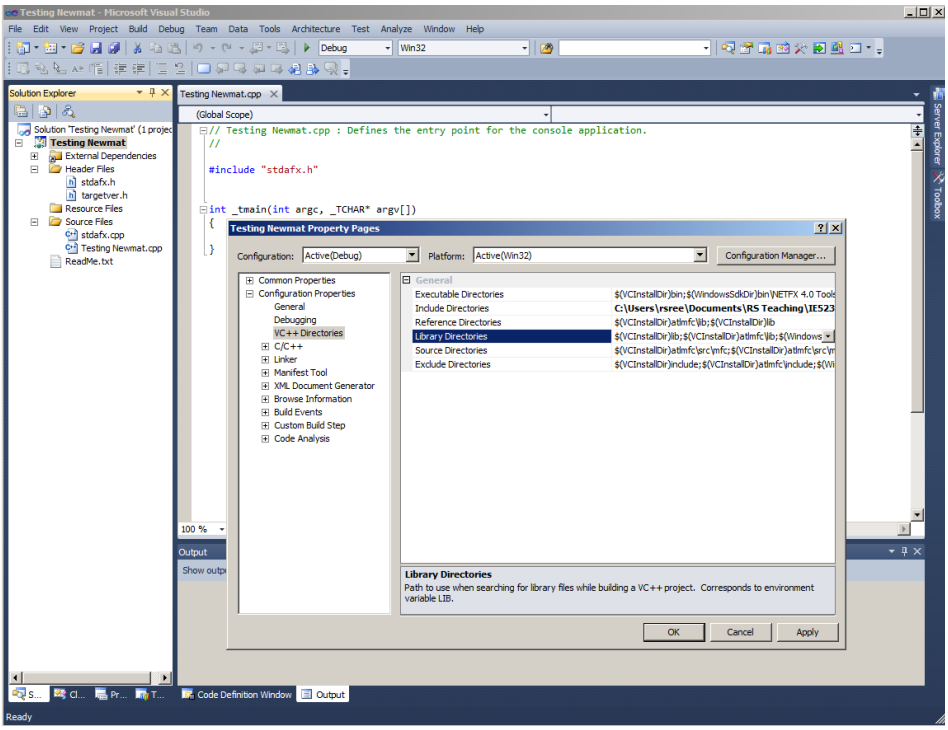

Figure 20: Screenshot relevant to step 3.

4. Using the steps identified before add the NEWMAT library file to the project (cf. figure 23, figure 24 and figure 25)

5. Now add the example.cpp file from the directory that contains the dowloaded NEWMAT files (cf. figures 26

6. (*Compiling the code*). Move your mouse over to the icon that says **Testing Newmat** on the left-hand window-pane. Click the left mouse button, pick **Build** from the first drop-down menu. If everything is OK, you should have a successful build (cf. figure 28).

7. (*Running the compiled code*) You have to run the command-line executable by clicking on the windows **Start** menu, followed by the words **cmd** in the Search Window (I am assuming you have Vista; cf. figure 28). In the command window that pops up, navigate to the directory that contains the executable file (cf. figure 29). Type *"Testing Newmat.exe"* on the

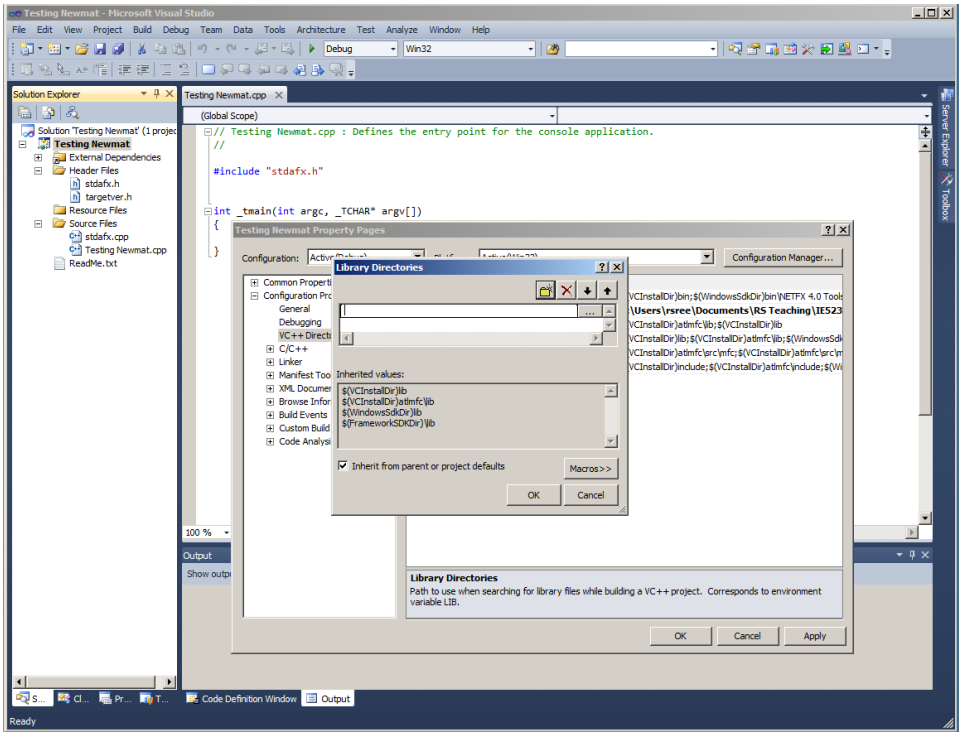

Figure 21: Screenshot relevant to step 3.

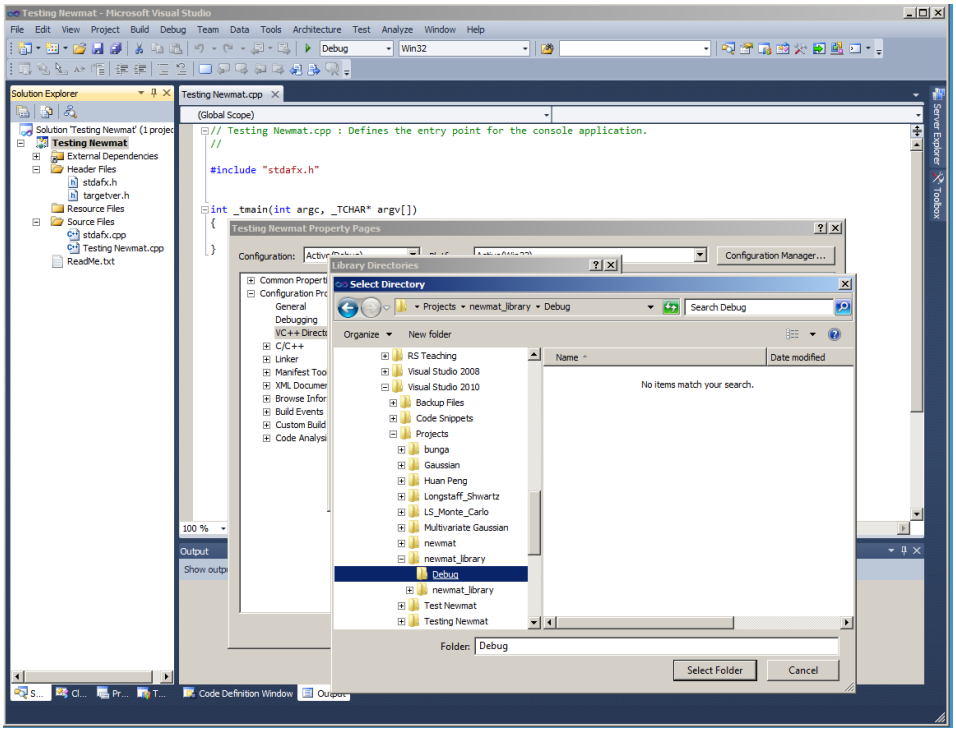

Figure 22: Screenshot relevant to step 3.

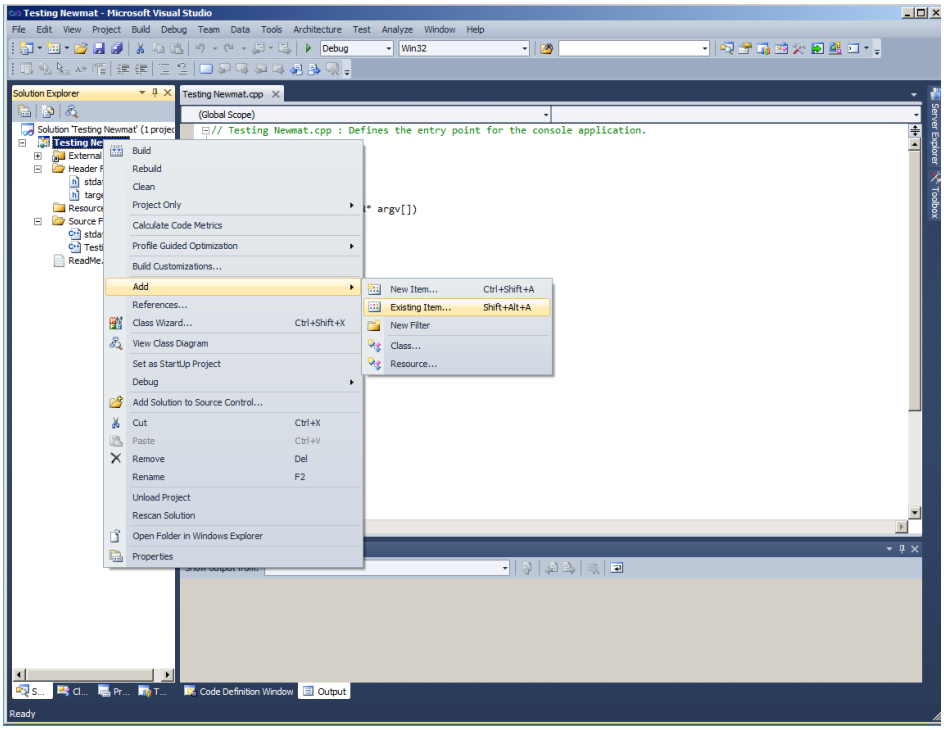

Figure 23: Screenshot relevant to step 4.

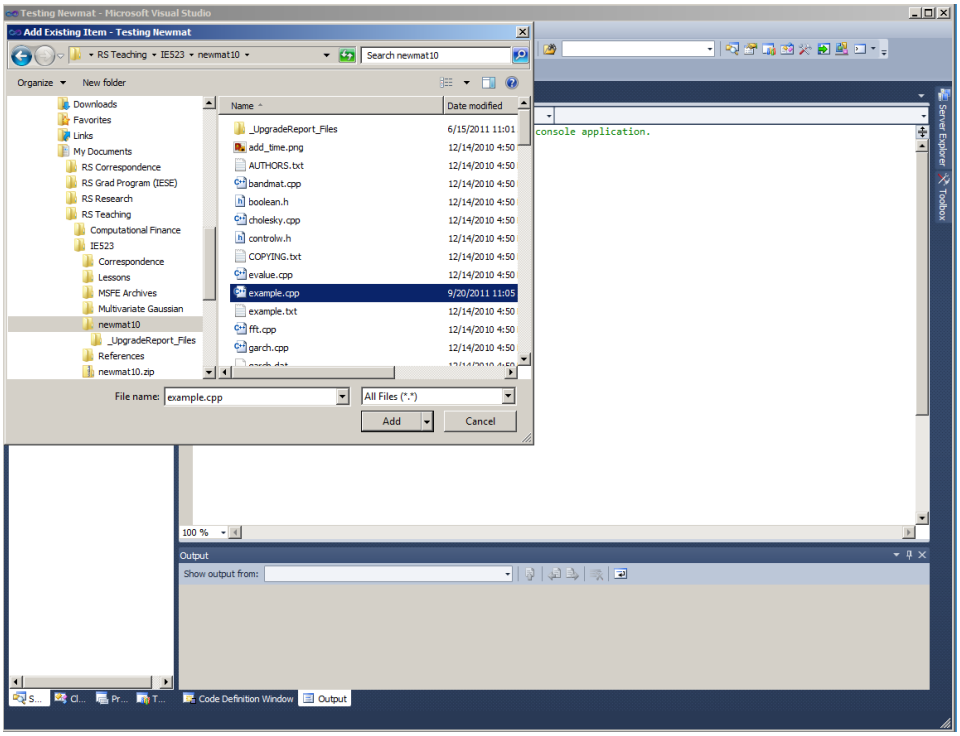

Figure 24: Screenshot relevant to step 4.

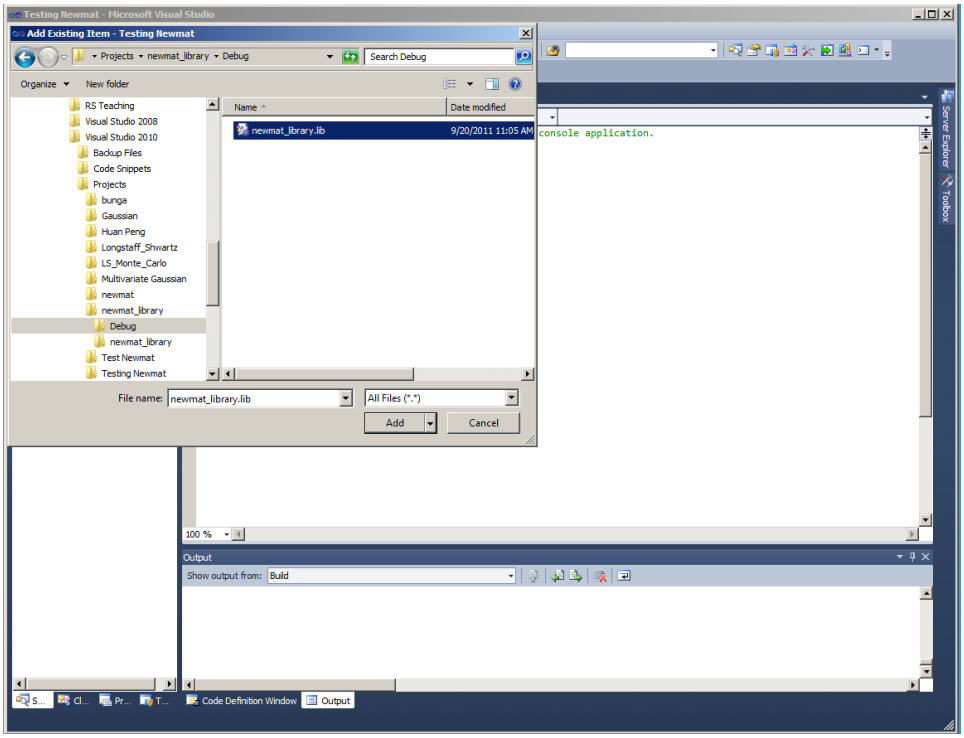

Figure 25: Screenshot relevant to step 4.

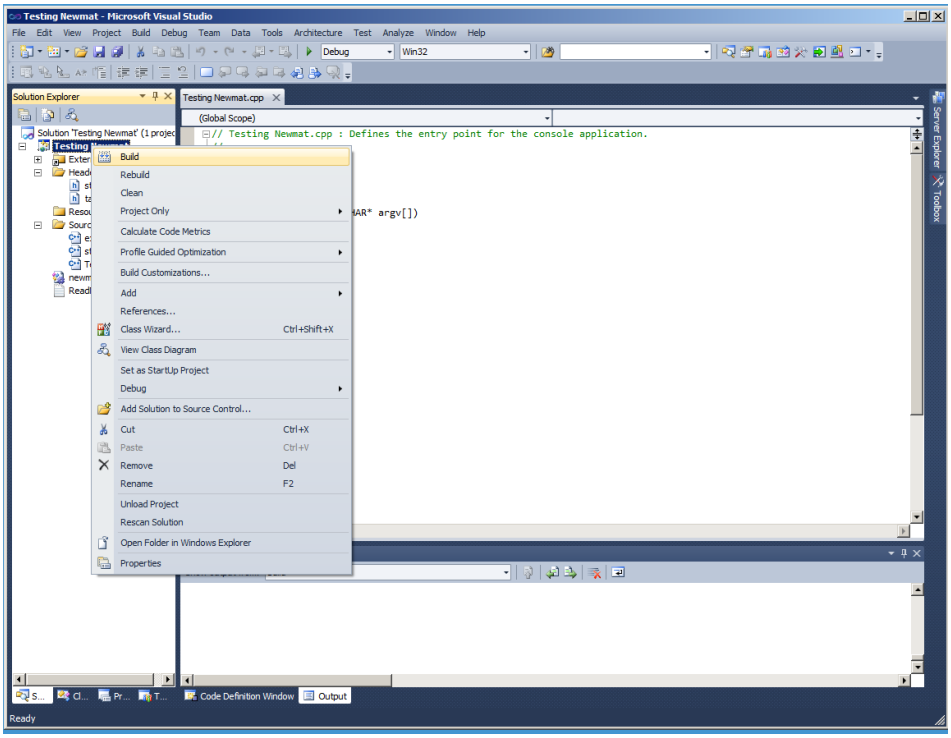

Figure 26: Screenshot relevant to step 5.

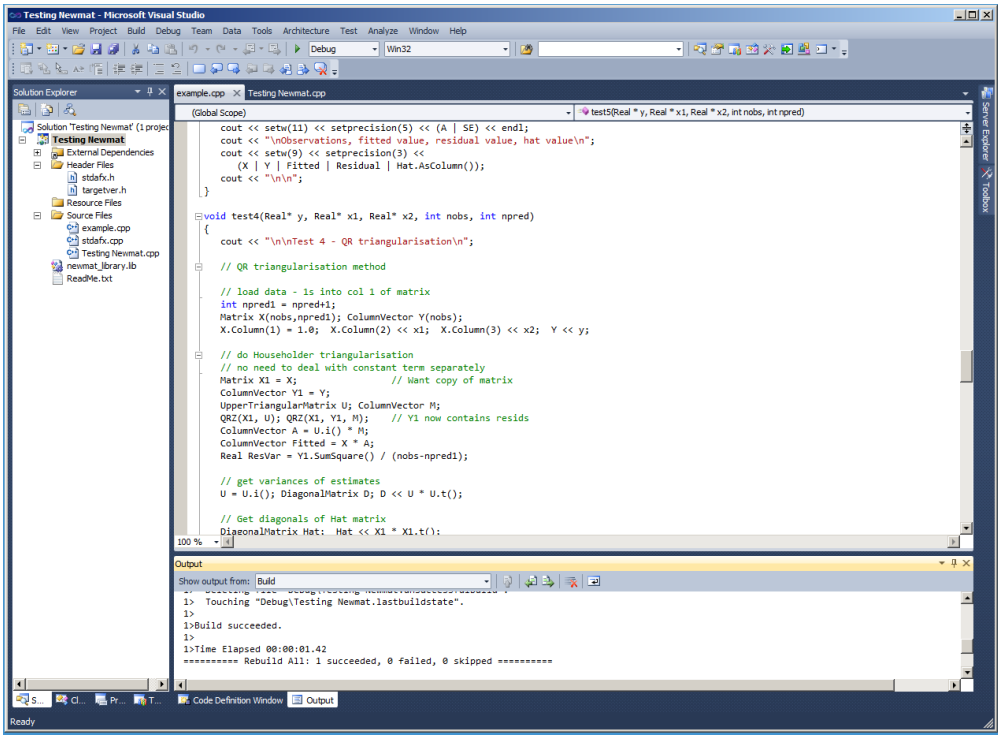

Figure 27: Screenshot relevant to step 6.

command-line and you should get a screen that looks like figure 30, which means you are good to go.

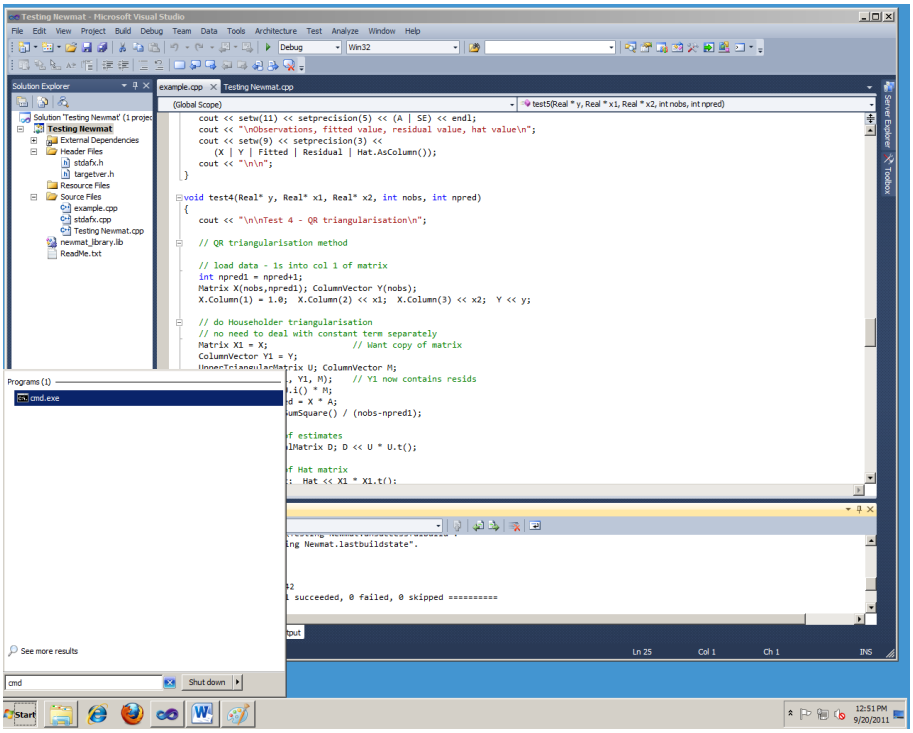

Figure 28: Screenshot relevant to step 7.

2 Mac Xcode

1. Download NEWMAT tar or zip file from here, and untar/unzip it. I would pick newmat11, as it has a few advanced-features that may be useful. You can move the folder with the Newmat files to a new directory if you wish.

2. Open the *Terminal* console. On the window that opens up, change directory (cd < *pathname* >) to the directory where you kept all the downloaded files. Check if you see a makefile called nm_gnu.mak (you can check it with an ls command).

3. Type "make -f nm_gnu.mak" and watch a bunch of messages that scroll up on your window[3]. When the scrolling stops, you should have a library file

[3]If you get a "make: Nothing to be done" message. You might have to touch all the files in the directory with a "touch *.*" command. A typical line on your window will read something like "g++ -o blah blah."

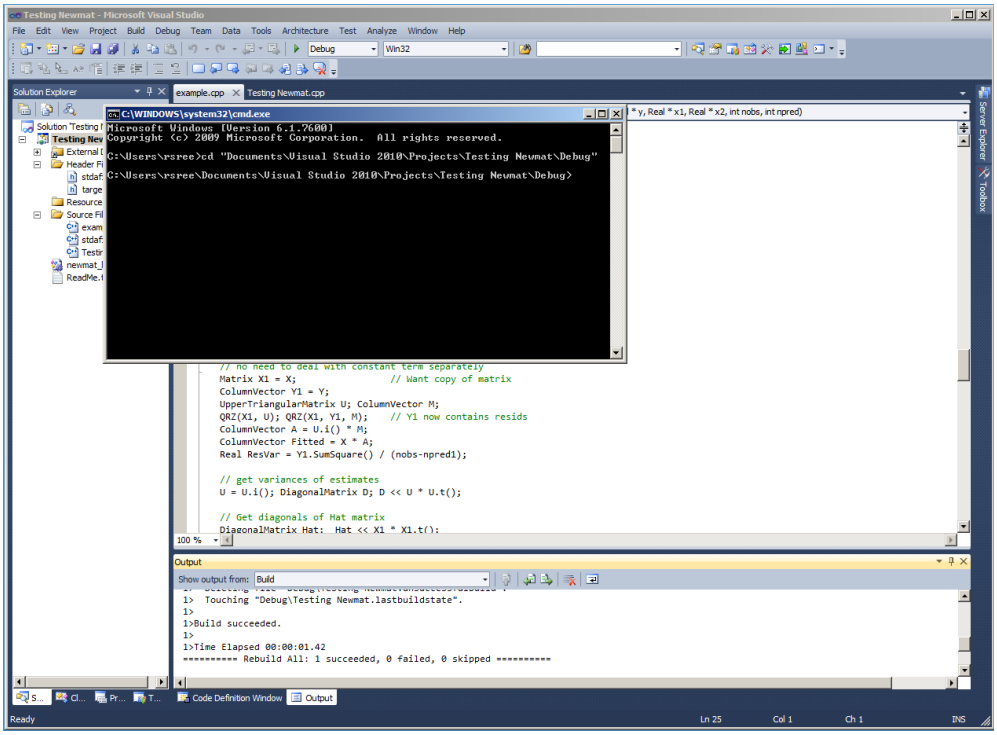

Figure 29: Screenshot relevant to step 7.

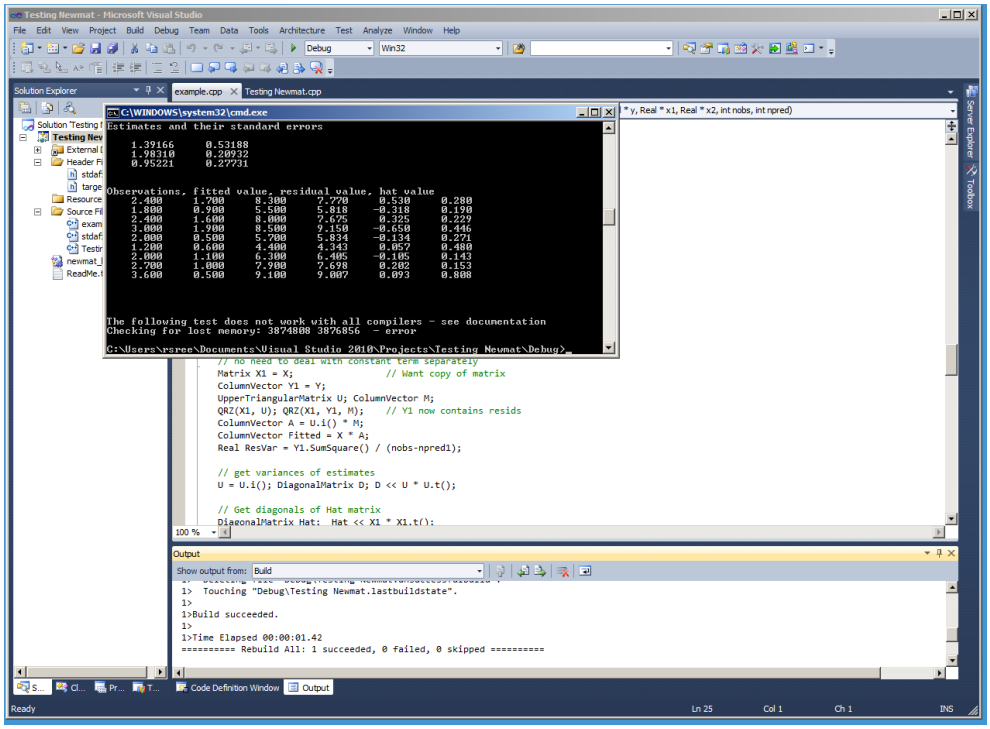

Figure 30: Screenshot relevant to step 7.

called libnewmat.a in the directory. This is all you need to be able to use *Newmat* library.

4. Open *Xcode* and write the C++ code as usual. If you are using *Newmat* routines in your code, you need to tell the compiler where it can find the *Newmat* library when you are ready to compile your C++ code. This involves a few steps.

5. Move your mouse to the project icon on the top-of-the-left-hand-side of the *Groups & Files* window pane (cf. figure 31). Click your mouse while simultaneously pressing the *control* button on your keyboard. You should see something like what is shown in figure 31. Select Get Info from the available menu-items

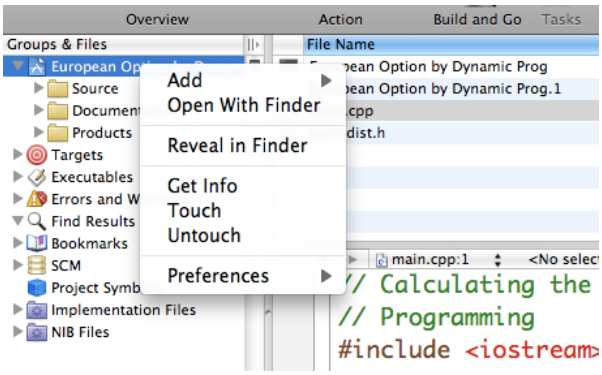

Figure 31: Screenshot relevant to step 5.

6. You should get something that looks like figure 32.

7. Scroll down this windows till you see the *Linking* settings. In the "*Other Linker Flags*" area, make sure you enter "**-lnewmat**" on the window in the left as shown in figure 33.

8. Scroll down this windows till you see the *Search Paths* settings. In the "*Library Search Paths*" and "*User Header Search Paths*" area, make sure you enter the pathname of the directory that contains all the newmat files you downloaded and compiled in step 6 on the windows in the left as shown in figure 34. Close this window and continue with your compilation. Everything should work fine.

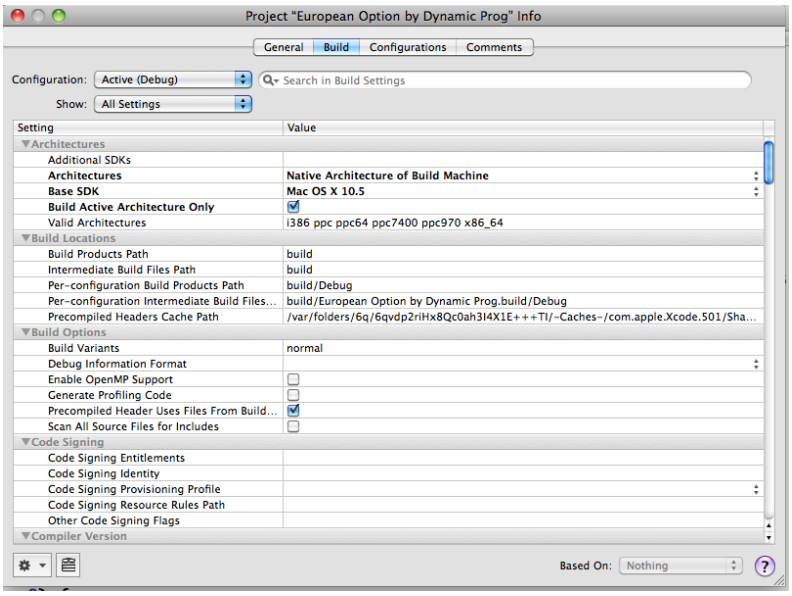

Figure 32: Screenshot relevant to step 6.

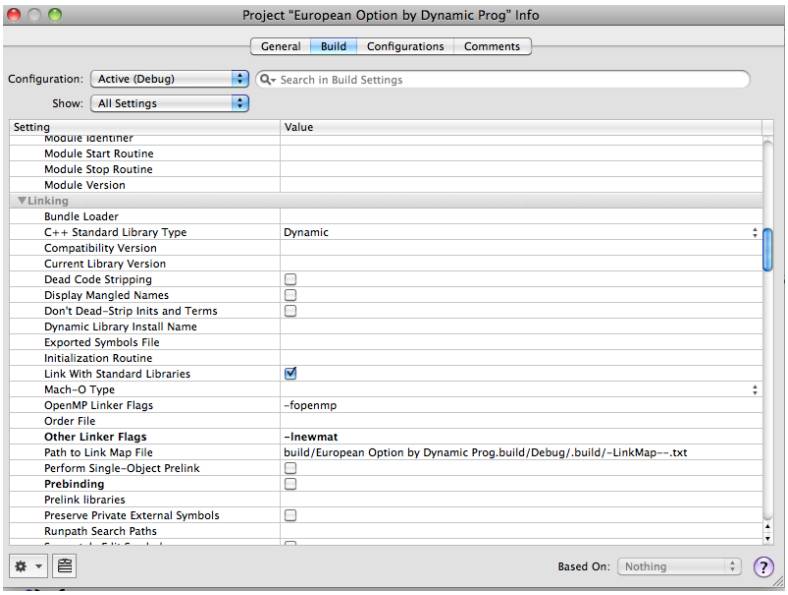

Figure 33: Screenshot relevant to step 7.

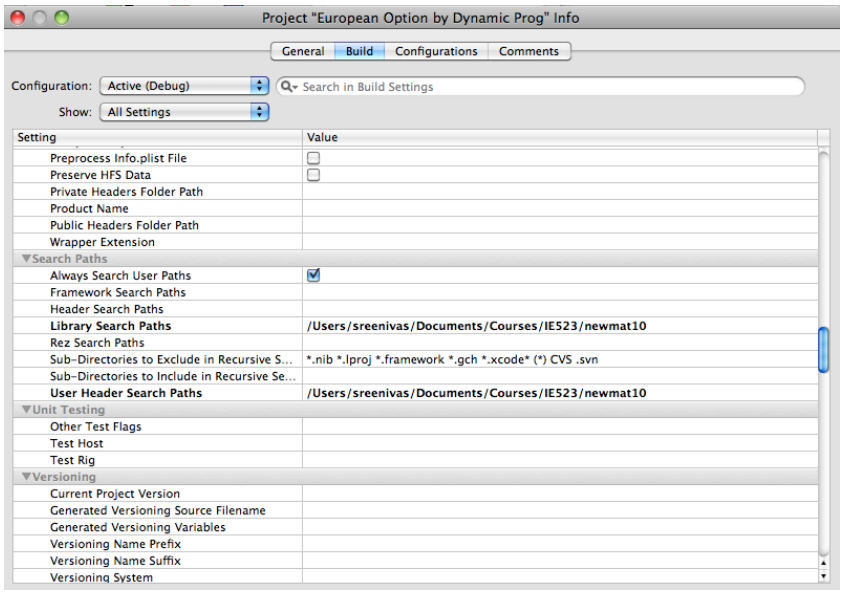

Figure 34: Screenshot relevant to step 7.