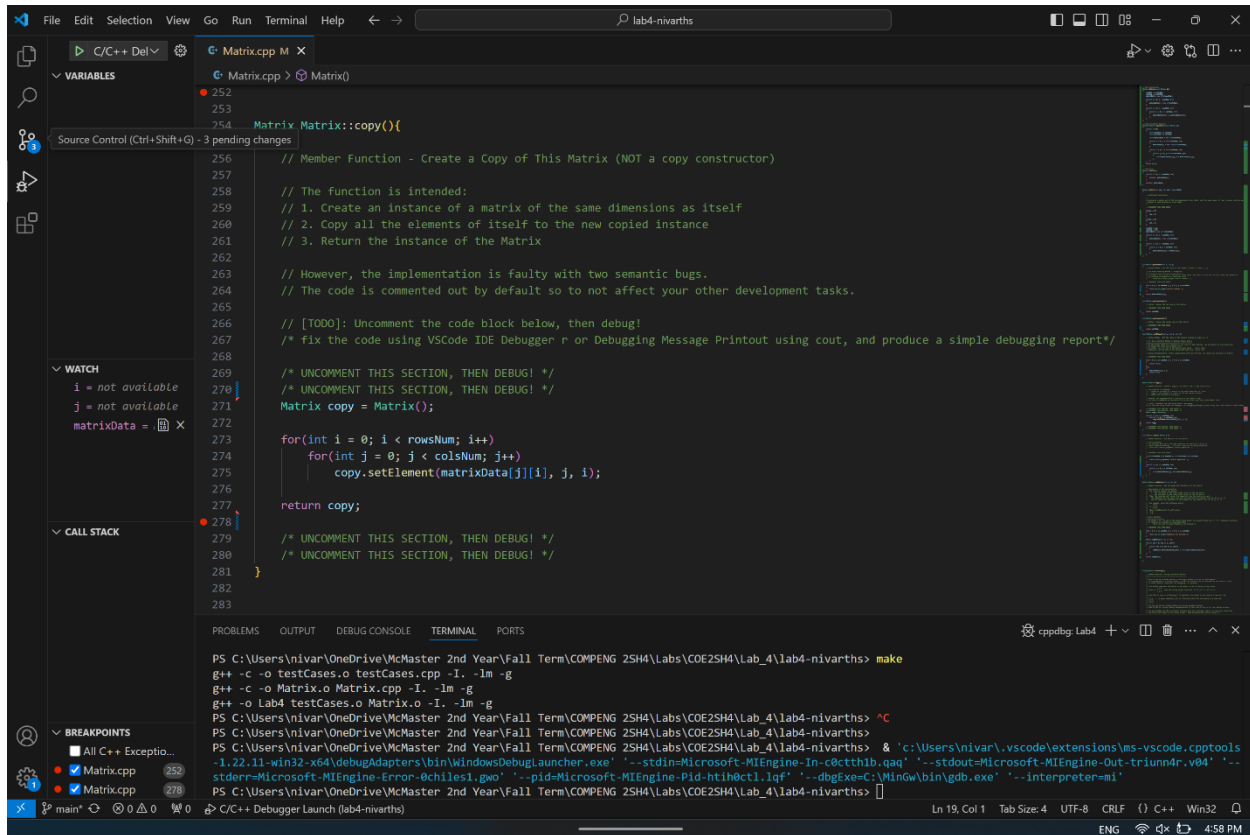


Semantic Error 1:

The first semantic error appears at line 271, where the function is attempting to create an instance of a previous matrix with the same dimensions. However, the function is currently creating a matrix using the default constructor, automatically creating a 3x3 matrix, even though the previous matrix may not be 3x3.



```
File Edit Selection View Go Run Terminal Help lab4-nivarths
C/C++ Del
Matrix.cpp M x
Matrix.cpp > Matrix()
252
253
254
255
Source Control (Ctrl+Shift+G) - 3 pending changes
256 // Member Function - Create a Copy of This Matrix (NOT a copy constructor)
257
258 // The function is intended:
259 // 1. Create an instance of a matrix of the same dimensions as itself
260 // 2. Copy all the elements of itself to the new copied instance
261 // 3. Return the instance of the Matrix
262
263 // However, the implementation is faulty with two semantic bugs.
264 // The code is commented out by default so to not affect your other development tasks.
265
266 // [TODO]: Uncomment the code block below, then debug!
267 // * fix the code using VSCode IDE Debugger or Debugging Message Printout using cout, and produce a simple debugging report*/
268
269 /* UNCOMMENT THIS SECTION, THEN DEBUG! */
270 /* UNCOMMENT THIS SECTION, THEN DEBUG! */
271 Matrix copy = Matrix();
272
273 for(int i = 0; i < rowNum; i++)
274     for(int j = 0; j < colNum; j++)
275         copy.setElement(matrixData[j][i], j, i);
276
277 return copy;
278
279 /* UNCOMMENT THIS SECTION, THEN DEBUG! */
280 /* UNCOMMENT THIS SECTION, THEN DEBUG! */
281 }
282
283
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
PS C:\Users\nivar\OneDrive\McMaster 2nd Year\Fall Term\COMPENG 2SH4\Labs\COE2SH4\Lab_4\lab4-nivarths> make
g++ -c -o testCases.o testCases.cpp -I. -lm -g
g++ -c -o Matrix.o Matrix.cpp -I. -lm -g
g++ -o Lab4 testCases.o Matrix.o -I. -lm -g
PS C:\Users\nivar\OneDrive\McMaster 2nd Year\Fall Term\COMPENG 2SH4\Labs\COE2SH4\Lab_4\lab4-nivarths> ^C
PS C:\Users\nivar\OneDrive\McMaster 2nd Year\Fall Term\COMPENG 2SH4\Labs\COE2SH4\Lab_4\lab4-nivarths>
PS C:\Users\nivar\OneDrive\McMaster 2nd Year\Fall Term\COMPENG 2SH4\Labs\COE2SH4\Lab_4\lab4-nivarths> & 'c:\Users\nivar\.vscode\extensions\ms-vscode.cpptools
-1.22.11-win32-x64\debugadapters\bin\WindowsDebuglauncher.exe' '--stdout=Microsoft-MIEngine-Out-trium4r.v04' '--
stderr=Microsoft-MIEngine-Error-0chiles1.gwo' '-pid=Microsoft-MIEngine-Pid-htihact1.lgf' '-dbgExe=C:\MinGW\bin\gdb.exe' '-interpreter=mi'
PS C:\Users\nivar\OneDrive\McMaster 2nd Year\Fall Term\COMPENG 2SH4\Labs\COE2SH4\Lab_4\lab4-nivarths>
main* 0 0 0 0 C/C++ Debugger Launch (lab4-nivarths) Ln 19, Col 1 Tab Size: 4 UTF-8 CRLF {} C++ Win32 ENG 4:58 PM
```

Figure 1: Semantic Error 1 before debug

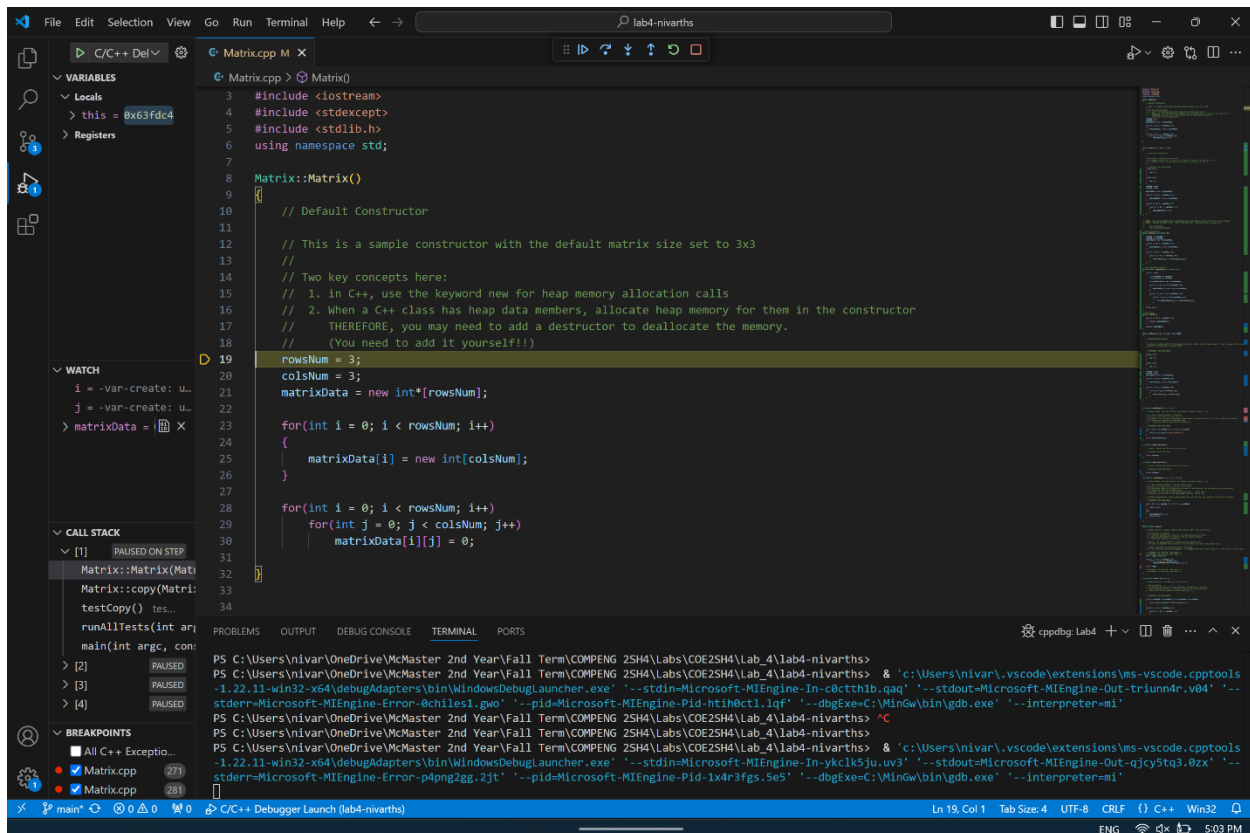


Figure 2: after step into, function goes into the default constructor rather than additional constructor.

Semantic error 1 debug:

To fix this, line 271 must be changed to `Matrix copy(this->rowsNum, this->colsNum)`. This will ensure that while the program is running, the program steps into the additional constructor instead, and an instance of a previous matrix is created with the same dimensions, rather than a default 3x3 matrix.

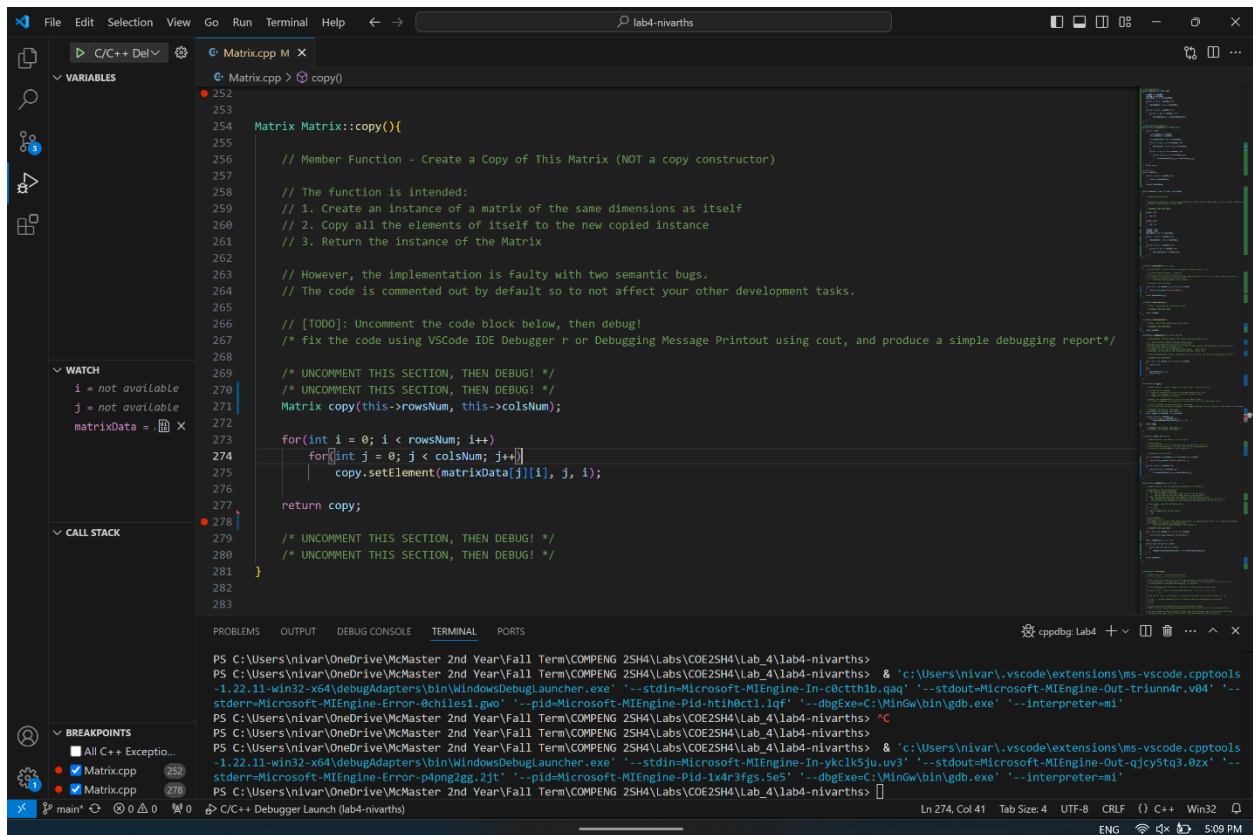


Figure 3: Screenshot showing that line 271 has been modified to now use additional constructor to copy dimensions correctly.

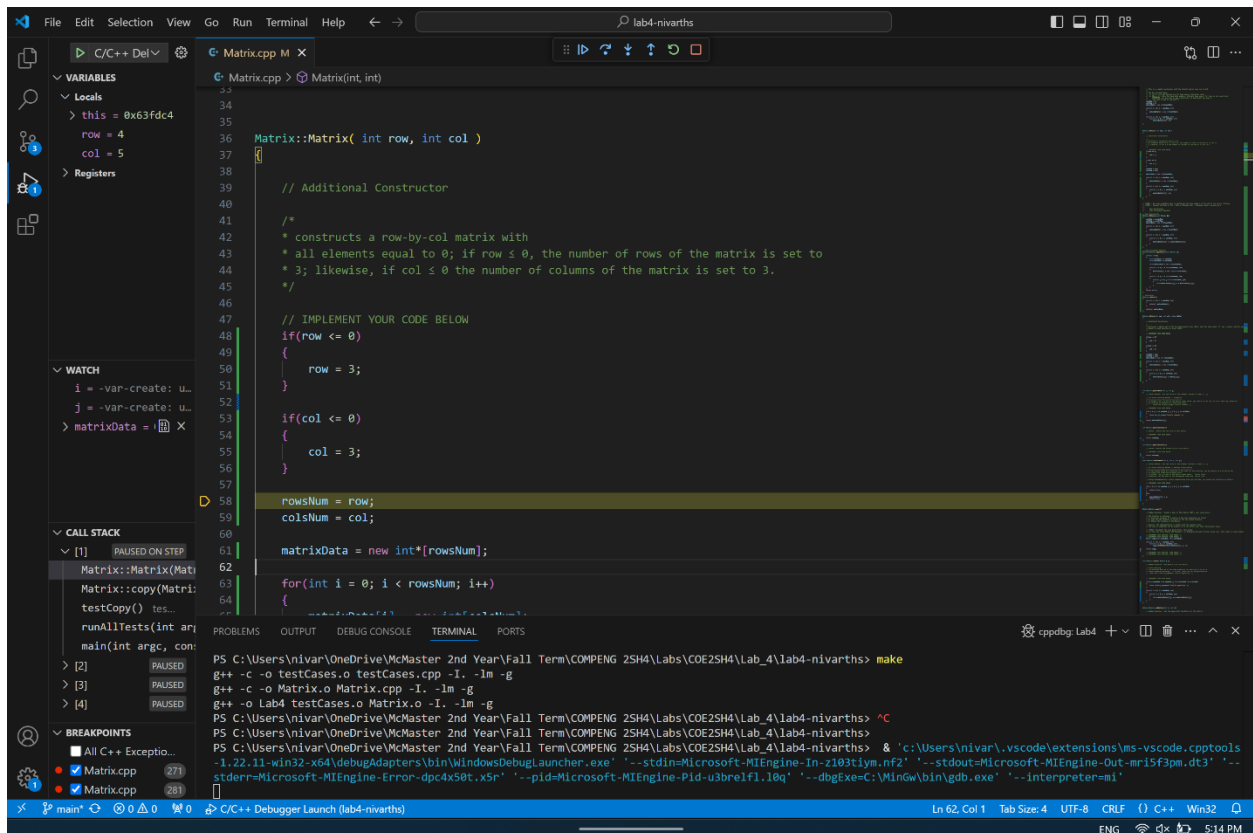


Figure 4: program now steps into and uses the additional constructor to copy dimensions correctly.

Semantic error 2:

The second semantic error present in this function is line 275, where the indices for the set element function are inverted (`matrixData[j][i]`). This results in segmentation fault and will not return the copied matrix.

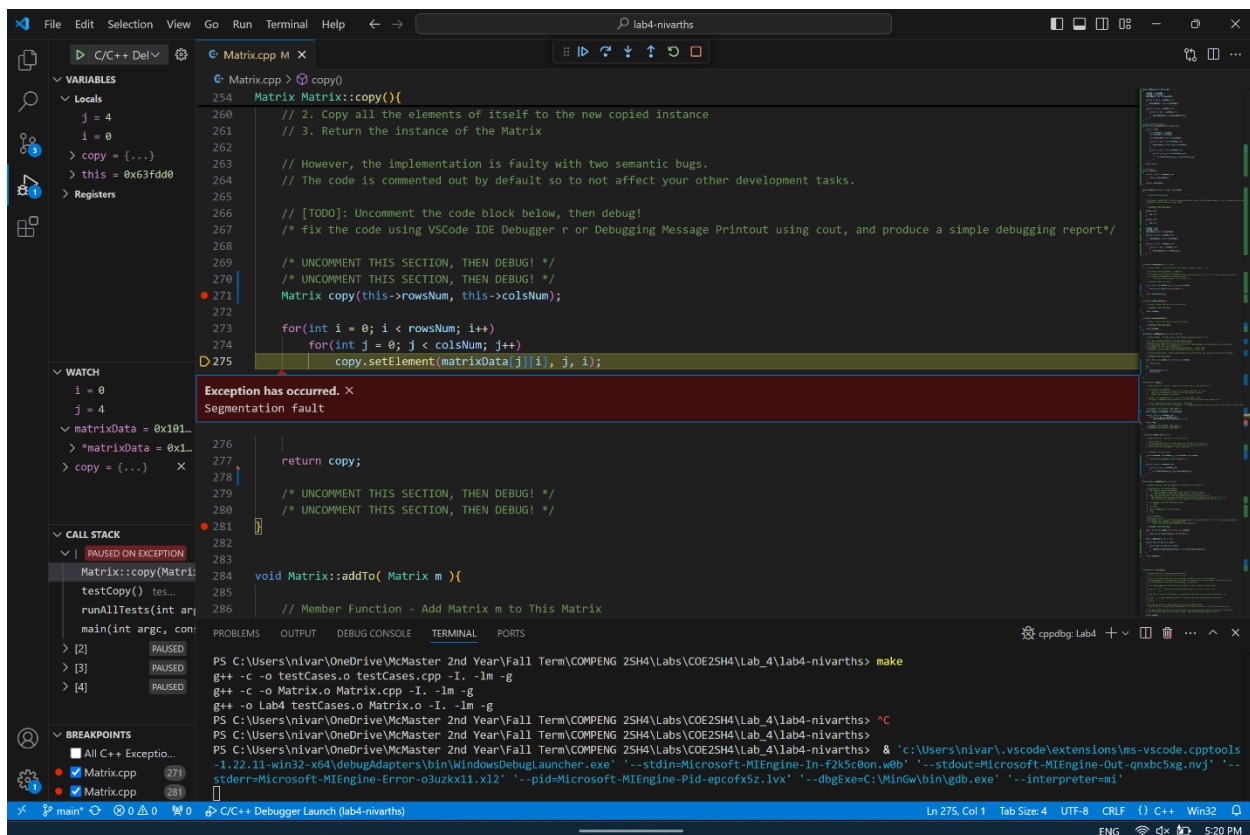


Figure 5: semantic error 2 producing a segmentation fault.

Semantic error 2 debug:

To fix this error, line 275 must be updated so the setElement function has the proper indices, so it can copy the values in the matrix correctly.

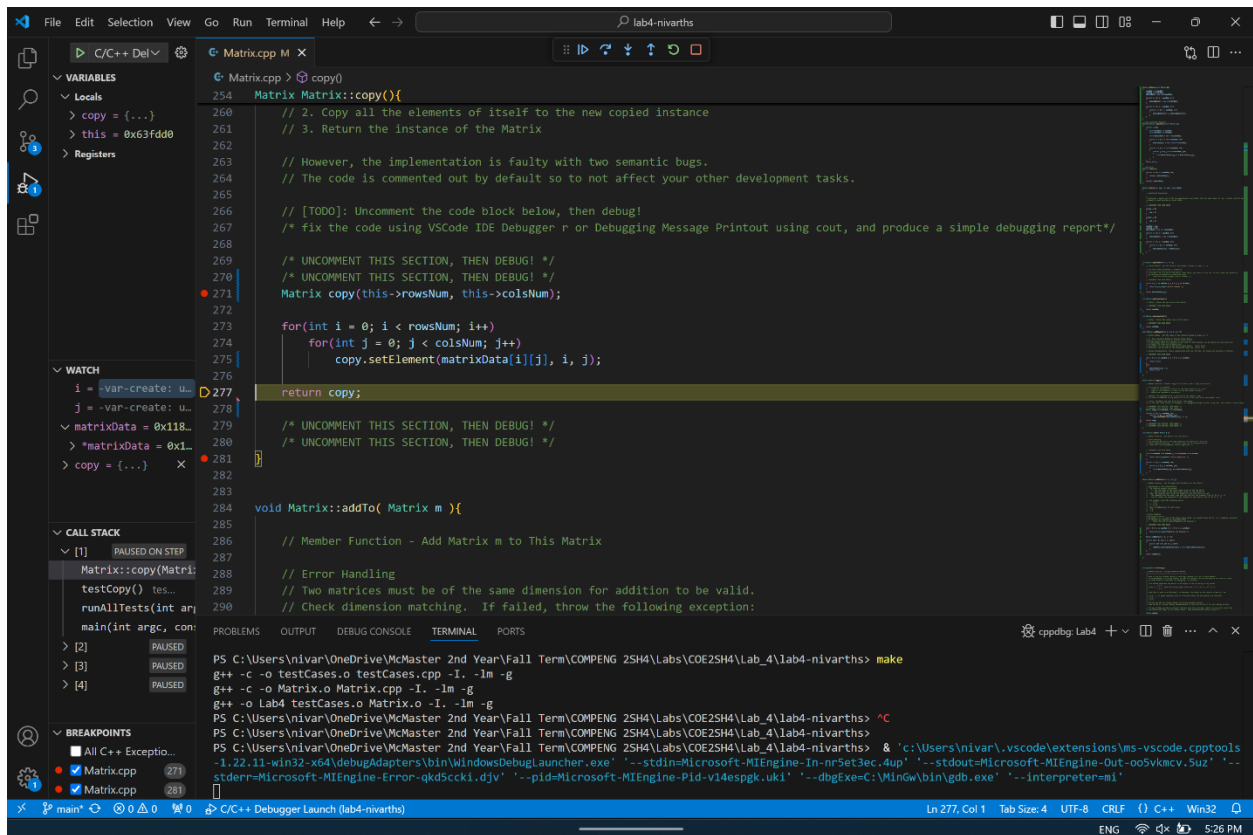


Figure 6: error has been debugged and line 275 has been updated, leading to no segmentation fault and the program moving on to returning the copied matrix.