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|  | Homework #4  Arrays and Character Sequences |  |

1. Ensure that you have read the lessons on [cplusplus.com](http://www.cplusplus.com/doc/tutorial/). Your solution should be a Code::Blocks project. All work will be done in one .cpp file. When you are ready to submit (or whenever you would like to save your work), you should “push” your work into your GitHub repository.
2. ([Structure of a program](http://www.cplusplus.com/doc/tutorial/program_structure/)) Copy the provided code into your workspace. It is also provided on [D2L, Teams, GitHub, etc.].
   1. **Comment this code thoroughly before proceeding.**

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| --- |
| #include <iostream>  #include <string>  using namespace std;  bool isPalindrome(const char word[], int length) {  // YOUR CODE HERE  }  int main() {  cout << "3/c Hopley Yeaton\n";  cout << "TOOP HW4\n";  bool quit = false;  while (!quit) {  string word;  cout << "Please enter a word ('quit' to exit): ";  getline(cin, word);  ADD CODE HERE TO MAKE UPPERCASE  if (!strcmp(word.c\_str(), "quit")) {  quit = true;  } else {  if (isPalindrome(word.c\_str(), word.length())) {  cout << "\"" << word << "\" is a palindrome!\n";  } else {  cout << "\"" << word << "\" is not a palindrome!\n";  }  }  }  int matrix[4][4] = {  {1, 2, 3, 4},  {0, 5, 6, 7},  {0, 0, 8, 9},  {0, 0, 0, 1}  };  // YOUR CODE HERE  for (int r = 0; r < 4; r++) {  for (int c = 0; c < 4; c++) {  cout << matrix[r][c] << " ";  }  cout << "\n";  }  cout << "Have a nice day!\n";  } |

**List 1.** Provided C++ Code for Homework 4

1. ([Arrays](http://www.cplusplus.com/doc/tutorial/arrays/), [Character Sequences](http://www.cplusplus.com/doc/tutorial/ntcs/)) Implement the isPalindrome() function.
   1. You may wish to read up on what a [palindrome](https://en.wikipedia.org/wiki/Palindrome) is.
      1. For the purpose of our program, a palindrome will be defined as a string that is read the exact same forwards and backwards ***without adjusting spacing and case insensitive***. For example, “Able was I ere I saw Elba” is a palindrome, but “Dogma I am God” is not.
   2. Using loops and indexing, determine if the character sequence passed to the function is a palindrome.
      1. This can be accomplished in one for loop, or you can use two simultaneous loops with two different indexing variables.
      2. You may wish to start a counter at the beginning of the array, a counter at the end of the array, and work towards the center of the array.
   3. If you choose to do so, implement tolower() or toupper() in order to ensure the function works for most inputs.
2. ([Arrays](http://www.cplusplus.com/doc/tutorial/arrays/)) Transpose the square matrix provided in the code.
   1. You will need to use nested loops for this.
   2. Consider the following example:

Original Matrix

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 2 | 3 | 4 |
| 0 | 5 | 6 | 7 |
| 0 | 0 | 8 | 9 |
| 0 | 0 | 0 | 1 |

Replace each element at row, column with the element at column, row. For example, 2 is located at (0, 1). Following the execution of our program, 2 should be located at (1, 0).

Transposed Matrix

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 0 | 0 | 0 |
| 2 | 5 | 0 | 0 |
| 3 | 6 | 8 | 0 |
| 4 | 7 | 9 | 1 |