CS180

Test 6 – 29 November 2019

1. State what a data type is, and list the names of two C++ data types
2. If the following lines of code were run five times in a row, assuming all necessary libraries etc. were loaded, show the output of this might produce.

srand(static\_cast<unsigned>(time(nullptr)));

unsigned value = rand() % 6 + 5;

cout << value << endl;

1. Given the initializations:

unsigned number1 = 47;

unsigned number2 = 10;

double number3 = 47.0;

double number4 = 10.0;

show the exact value of each of the following expressions:

1. number1 / number2
2. number1 / number4
3. number1 % number2
4. number3 + number4

4. Indicate the value of each expression:

a) 5 > 6 ? ‘a’ : ‘b’

b) Given the initializations:

string feline = “cat”;

string canine = “DOG”;

the expression: feline < canine

c) (3 < 7 || 5 != 5) && 1.2 < 3.4

5. Assuming that x and y are variables declared and initialized as doubles, write the fragment of code that you would use to determine whether they are equal.

1. A file name data.txt exists on disk that continue exactly 100 integers. Write a fragment of C++ code that declares necessary variables and constants, reads the numbers from the file. And finds the smallest and largest values. Print the smallest and largest to the screen after all of the numbers have been read.
2. Write the definition of a function that finds and returns the position of the minimum value in an unsorted vector of int values. Do not write a prototype or any Javadoc, just the function itself.

8. Assume the following declarations have already been made:

int array1 [SIZE];

int array2 [SIZE];

and assume some code has already been run that fills array1 with data. Write a code fragment that will copy the entire contents of array1 into array2

9.Given the following array

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3 | 4 | 7 | 11 | 14 | 16 | 23 |

Show the exact sequence of values taken on by the variable middle in searching for each of the. Following values, using binary search, for each values below

1. 2
2. 18
3. 7

10. Given the following code, draw a picture of memory when line 14 has just finished, and then show what would change by the time line 16 has just finished by lightly crossing out any previous values and showing the new values. Be sure to diagram the memory for both main and for **increment\_a\_value**. Finally, show the output when the code is run to completion

1 int main()

2 {

3 int array[] {3, 8, 9, 5, 4};

4

5 increment\_a\_value(array, 3);

6 for (auto item : array)

7 {

8 cout << item << ‘ ‘;

9 }

10 cout << endl;

11 return 0;

12 }

13

14 void increment\_a\_value(int values[], size\_t position)

15 {

16 values[position]++;

17 }

11. Write the linear search algorithm

12. Write the bubble sort algorithm

13. Write the binary search algorithm