Lab 10 Work

You always create a separate C++ file for each program you write in lab.

1. Write a C++ program that does the following:
   a. Create a C++ file with the name **problem1.cpp**.
   b. Implement the following four functions used in the main function given below.
   c. `int numberOdd(int x, int y)` returns how many of its two arguments are odd.
   d. `int closest(double x)` returns the closest integer to argument x.
   e. `int max(int a, int b, int c, int d)` returns the maximum of the four arguments.
   f. `int firstDigit(int x)` returns the leftmost digit of the argument. Assume the argument is positive.
   g. Type in the following main function into your C++ program file:

```
int main()
{
  cout << numberOdd(0, 8) << endl;     //0
  cout << numberOdd(7, 8) << endl;     //1
  cout << numberOdd(7, 99) << endl;    //2
  cout << closest(3.35) << endl;       //3
  cout << closest(3.75) << endl;       //4
  cout << max(3, 1, 5, 1) << endl;     //5
  cout << max(0, 1, 2, 6) << endl;     //6
  cout << max(-1, 7, 4, 1) << endl;    //7
  cout << max(11, 1, 4, 1) << endl;    //11
  cout << firstDigit(19683) << endl;   //1
  cout << firstDigit(27) << endl;      //2

  return 0;
}
```

2. Write a C++ program that does the following:
   a. Create a C++ file with the name **problem2.cpp**.
   b. Write the function **oddLessEven** which returns the sum of the odd valued digits minus the sum of the even valued digits of the positive integer parameter.
   c. Type in the following main function into your C++ program file:

```
int main()
{
  cout << oddLessEven(23) << endl; // prints 1
  cout << oddLessEven(1234) << endl; // prints -2
  cout << oddLessEven(777) << endl; // prints 21

  return 0;
}
```

3. Write a C++ program that does the following:
   a. Create a C++ file with the name **problem3.cpp**.
   b. Write the function **sumRatios** which computes the sum of the ratios of the corresponding digits of its two positive integer parameters. Assume both parameters have the same number of non-zero digits.
   c. For example, if the two parameters are 132 and 568, then sumRatios computes and returns 1/5 + 3/6 + 2/8 which equals 0.95.
   d. Type in the following main function into your C++ program file:

```
int main()
{
  cout << sumRatios(132, 568) << endl; // prints 0.95
  cout << sumRatios(123, 456) << endl; // prints 1.15

  return 0;
}
```

4. Write a C++ program that does the following:
   a. Create a C++ file with the name **problem4.cpp**.
   b. Write the function **areVeryDifferent** which determines whether the two integer parameters are very different if they differ by more than 10.
   c. Type in the following main function into your C++ program file:

```
int main()
{
  int x = 4, y = 10, z = -4;
  if (areVeryDifferent(x, y))
    cout << "x and y are very different." << endl;
  if (areVeryDifferent(x, z))
    cout << "x and z are very different." << endl;
  if (areVeryDifferent(y, z))
    cout << "y and z are very different." << endl;

  return 0;
}
```

   d. The output from this program is:
   y and z are very different.

5. Write a C++ program that does the following:
   a. Create a C++ file with the name **problem5.cpp**.
   b. Write the function **countChange** which has four parameters q, d, n, and p computing the value of q quarters, d dimes, n nickels, and p cents into dollars.
   c. Type in the following main function into your C++ program file:

```
int main()
{
  int q = 10, d = 5, n = 1, p = 2;
  double x = countChange(q, d, n, p);
  cout << "You have $" << x << "." << endl;

  return 0;
}
```

   d. The output from this program is:
   You have $3.07.

Lab Work Submission:

- You can continue to work on this lab after our lab class, on your own, at home.
- Submit your lab work via Blackboard on or before: **Sunday, April 27, 2025**.
- This is the only accepted submission method!
- Once you submit your assignment you will not be able to resubmit it!
- Make absolutely sure the C++ files you want to submit are the C++ files you want graded.
- You will not be able to submit your lab work under any circumstances once **Lab 10 Work** disappears at **12:00 a.m.** on **Monday, April 28, 2025**.
- There will be **NO** exceptions to these rules!
- To submit your lab work, upload the 5 C++ files you did for this lab (**with .cpp extension**) to the **Lab 10 Work** assignment in the **Lab Work** tab on Blackboard.
- Then, make sure you click the **Submit** button to submit your lab work.

The lab work is worth a total of **9** points based only on grading one of the problems (**a randomly chosen one**). Grading steps for the chosen problem are as follows:

1. If your program does NOT compile successfully, then the grade for the lab is zero.
2. If your program produces runtime errors or does NOT produce the expected output, then the grade for the lab is zero.
3. If the program compiles, runs, and produces the expected output, then the grade is computed as follows:
   a. 8 points – the program compiles, runs, and produces the expected output
   b. 1 point – proper indentation and formatting of the code