

Homework 4
Due 5pm, Wednesday, May 3, 2017

Starting from this homework, we may take off up to 20% of the total marks for poor style. Make sure to name your variables reasonably, indent properly, and comment sufficiently.

Submit `dec_to_hex.cpp` for problem 1, `hex_to_bin.cpp` for problem 2, and `cap.cpp` for problem 3.

Problem 1: (Decimal to hex)

Write a program that converts a nonnegative decimal number into a hexadecimal number. The input and output should be exactly:

```
Enter a decimal number:
[USER ENTERS A NONNEGATIVE INTEGER]
Your number in hex is 0xXX.
```

For example, an input of 4095 should produce the output

```
Your number in hex is 0xFFFF.
```

You may not use any libraries aside from `iostream` and `string`. You may not use the `dec`, `hex`, or `oct` format flags provided by the `iostream` library. You may not use the `stoi`, `stol`, `stoul`, `stoll`, `stoull`, `stof`, `stod`, and `stold` functions provided by the `string` library.

Hint. Consider the following code.

```
int i = 15;
char c = static_cast<char>(i-10+'A');
string s = string(1,c); //convert char into a string of length 1
cout << s << endl;
```

The output is F.

Problem 2: (Hex to binary)

Write a program that converts a nonnegative hexadecimal number into a binary number. The input and output should be exactly:

```
Enter a hexadecimal number:
[USER ENTERS A NONNEGATIVE HEXADECIMAL INTEGER]
Your number in binary is 0bXXXX.
```

For example, an input of `0xffa` should produce the output

Your number in binary is 0b111111111010.

An input of 0x1C should produce the output

Your number in binary is 0b11100.

Assume the input starts with 0x or 0X. Your program must work with both capital and lower case inputs. You may not use any libraries aside from `iostream` and `string`. You may not use the `dec`, `hex`, or `oct` format flags provided by the `iostream` library. You may not use the `stoi`, `stol`, `stoul`, `stoll`, `stoull`, `stof`, `stod`, and `stold` functions provided by the `string` library.

Hint. You may find `s.erase(..., ...)` and `s.length()` useful, where `s` is of type `string`.

Problem 3: (Enforcing capitalization)

Write a program that enforces the following capitalization rule: the first letter of every word (including articles, coordinating conjunctions, and prepositions) should be capitalized. The input can have capital letters, lower case letters, spaces, and periods. No need to handle other punctuation. The input and output should be exactly:

Input a sentence:

[USER ENTERS A STRING]

The correct capitalization is:

XXXX

For example, an input of

If YOU come. at four THEN at THREE i shall Begin to be happy.
should produce the output

If You Come. At Four Then At Three I Shall Begin To Be Happy.

An input of

as with all MATTERS oF the HEART youll kNOW when you find IT
should produce the output

As With All Matters Of The Heart Youll Know When You Find It

You may not use any libraries aside from `iostream` and `string`.

Hint. You'll discover that `string s; cin >> s;` doesn't work. Use `string s; getline(cin, s);`.

Hint. Your input can end with a period, and it can end with a space. Make sure the program correctly handles these cases.

Hint. The output of

```
string s = "xxxxx";  
s[2] = 'i';  
cout << s << endl;  
cout << typeid(s[2]).name() << endl;
```

is `xxixx` and `char`.