Cairo University
Faculty of Computer and Information

CS111: Fundamentals of CS

Year 2017-2018

Second Semester

Assignment 2 – Version 2.0

Answers

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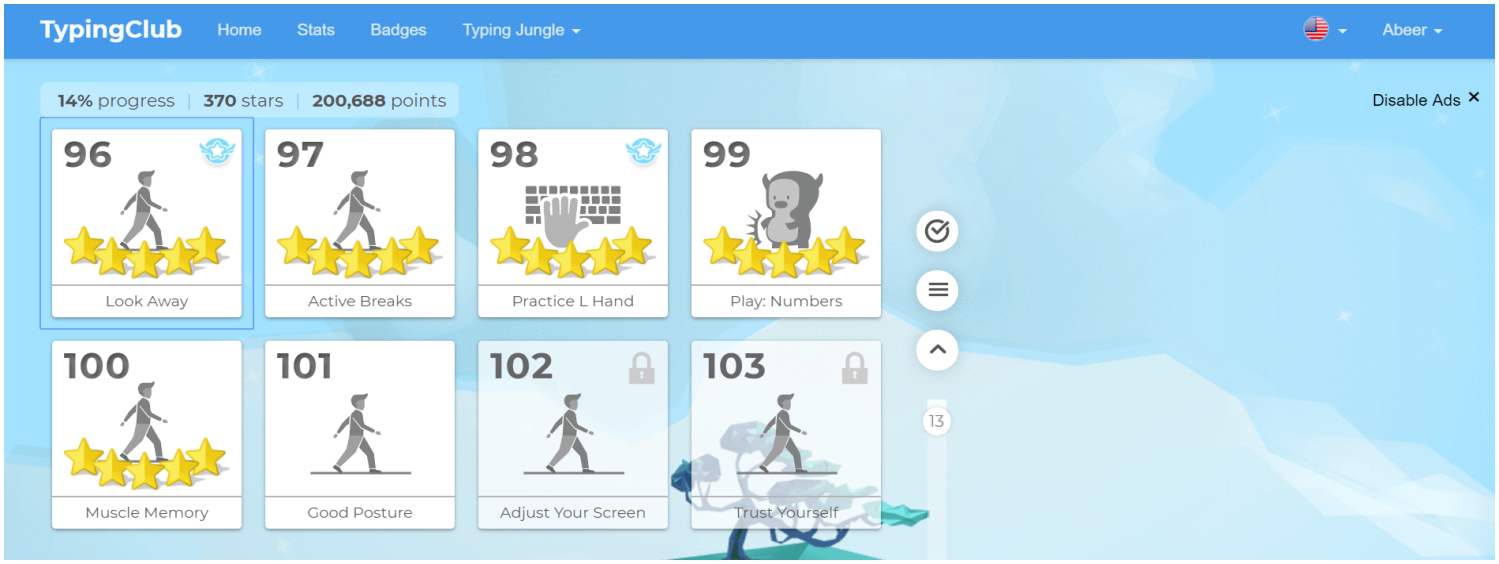
CS111: Fundamentals of CS

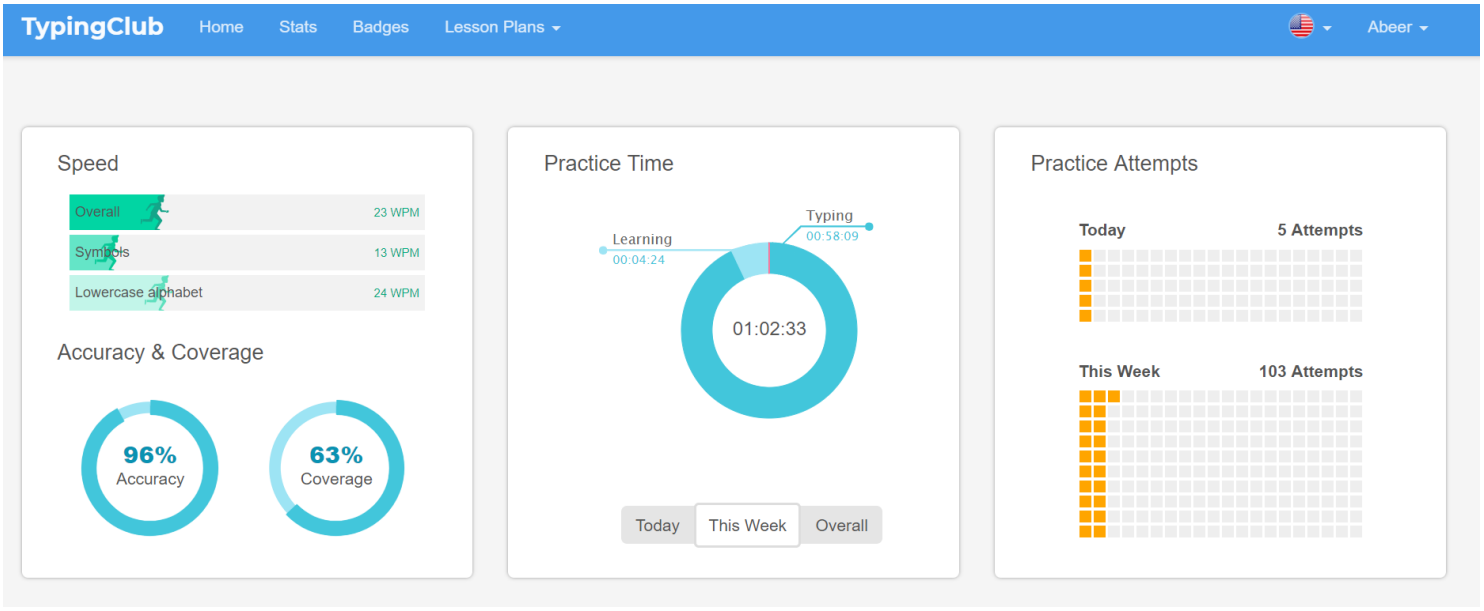
Assignment 2

Task 1 individual Task :

Typingclub.org

100 lessons done on Website





CS111: Fundamentals of CS

Assignment 2

Task 2 individual Task : 4- Baconian Cipher

Algorithm

Each letter is assigned to a string of five binary digits. These could be the letters 'A' and 'B',
the numbers 0 and 1 or whatever else you may desire. An example Baconian Cipher Encoding might be:

A = aaaaa I/J = abaaa R = baaaa
B = aaaab K = abaab S = baaab
C = aaaba L = ababa T = baaba
D = aaabb M = ababb U/V = baabb
E = aabaa N = abbaa W = babaa
F = aabab O = abbab X = babab
G = aabba P = abbba Y = babba
H = aabbb Q = abbbb Z = babbb

To encipher a message, e.g. 'STRIKE NOW', we replace each letter:

S T R I K E N O W
baaab baaba baaaa abaaa abaab aabaa abbaa abbab babaa

```cpp
// FCI – Programming 1 – 2018 - Assignment 2
// Program Name: baconian cipher.cpp
// Last Modification Date: 01/03/2018
// Author1 and ID and Group: 20170164
// Teaching Assistant: mohamed atta
// Purpose:encrypt by baconian cipher

#include <stdio.h>
#include <iostream>
#include <map>
#include <ctype.h>
#include <string>
using namespace std;

//Simple Baconian cipher for letters
int main()
{
    string message;
    int option;

    map <char, string> ciphertext {{'a',"aaaaa"},{'b',"aaaab"},{'c',"aaaba"},{'d',"aaabb"},{'e',"aabaa"},{'f',"aabab"},{'g',"Aabba"},{'h',"Aabbb"},

{'i',"Abaaa"},{'j',"Abaab"},{'k',"Ababa"},{'l',"Ababb"},{'m',"Abbaa"},{'n',"abbab"},{'o',"abbba"},{'p',"abbbb"},{'q',"baaaa"},{'r',"baaab"},

{'s',"baaba"},{'t',"baabb"},{'u',"babaa"},{'v',"babab"},{'w',"babba"},{'x',"babbb"},{'y',"bbaaa"},{'z',"bbaab"}};


    cout << "Choose an option for the Baconian cipher:\n 1) to encrypt \n 2) to decrypt\n";

    cin >>option;
    cin.ignore();

    char letter;

    if (option == 1)
    {

        cout << "\nEnter the message in plaintext\n\n";
        getline(cin, message);

        for (int i = 0; i < message.length(); i++) //iterates through input, if alphabet, convert to ciphertext, if space, ignores, if anything else, prints through
        {
            if (isalpha(message[i]))
            {
                letter = tolower(message[i]);
                cout << ciphertext.at(letter);
            }

            else if (isspace(message[i]))
            {
                cout << "";
            }

            else
            {
                cout << message[i];
            }
        }

        cout << "\n";
    }

    if (option == 2)
    {
        string parsed_char;

        cout << "\nEnter the message in ciphertext\n\n";
        getline(cin, message);

        for (int i = 0; i < message.length(); i = i + 5) //iterates through message in chunks of 5 char
        {
            for (int j = 0; j < 5; j++) //creates string parsed_char equal to chunk of 5 char
            {
                parsed_char = parsed_char + message[i + j];
            }

            for (int k = 0; k < 26; k++) //creates alphabet, checks if parsed_char is
```

```
    value of any letter key in map and prints letter if value is in ciphertext map
76                {
77                    int iter = 97 + k;
78                    letter = char(iter);
79                    if (ciphertext.at(letter) == parsed_char)
80                    {
81                        cout << letter;
82                    }
83                }
84                parsed_char = "";
85            }
86
87
88        }
89        cout << "\n";
90    }
91
92
93
```

```
1   // FCI – Programming 1 – 2018 - Assignment 2
2   // Program Name: baconian cipher.cpp
3   // Last Modification Date: 01/03/2018
4   // Author1 and ID and Group: 20170164
5   // Teaching Assistant: mohamed atta
6   // Purpose:encrypt by baconian cipher
7
8   #include <stdio.h>
9   #include <iostream>
10  #include <map>
11  #include <ctype.h>
12  #include <string>
13  using namespace std;
14
15  //Simple Baconian cipher for letters
16  int main()
17  {
18      string message;
19      int option;
20
21      map <char, string> ciphertext
    {{'a',"00000"},{'b',"00001"},{'c',"00010"},{'d',"00011"},{'e',"00100"},{'f',"00101"},{'g',"
    00110"},{'h',"00111"},
22
    {'i',"01000"},{'j',"01001"},{'k',"01010"},{'l',"01011"},{'m',"01100"},{'n',"01101"},{'o',"0
    1110"},{'p',"01111"},{'q',"10000"},{'r',"10001"},
23
    {'s',"10010"},{'t',"10011"},{'u',"10100"},{'v',"10101"},{'w',"10110"},{'x',"10111"},{'y',"1
    1000"},{'z',"11001"}};
24
25
26      cout << "Choose an option for the Baconian cipher:\n 1) to encrypt \n 2) to decrypt\n";
27
28      cin >>option;
29      cin.ignore();
30
31      char letter;
32
33      if (option == 1)
34      {
35
36          cout << "\nEnter the message in plaintext\n\n";
37          getline(cin, message);
38
39          for (int i = 0; i < message.length(); i++) //iterates through input, if alphabet,
    convert to ciphertext, if space, ignores, if anything else, prints through
40          {
41              if (isalpha(message[i]))
42              {
43                  letter = tolower(message[i]);
44                  cout << ciphertext.at(letter);
45              }
46
47              else if (isspace(message[i]))
48              {
49                  cout << "";
50              }
51
52              else
53              {
54                  cout << message[i];
55              }
56          }
57
58          cout << "\n";
59      }
60
61      if (option == 2)
62      {
63          string parsed_char;
64
65          cout << "\nEnter the message in ciphertext\n\n";
66          getline(cin, message);
67
68          for (int i = 0; i < message.length(); i = i + 5) //iterates through message in
    chunks of 5 char
69          {
70              for (int j = 0; j < 5; j++) //creates string parsed_char equal to chunk of 5
    char
71              {
72                  parsed_char = parsed_char + message[i + j];
73              }
74
75              for (int k = 0; k < 26; k++) //creates alphabet, checks if parsed_char is
```

```
    value of any letter key in map and prints letter if value is in ciphertext map
76                {
77                    int iter = 97 + k;
78                    letter = char(iter);
79                    if (ciphertext.at(letter) == parsed_char)
80                    {
81                        cout << letter;
82                    }
83                }
84                parsed_char = "";
85            }
86
87
88        }
89        cout << "\n";
90    }
91
92
93
```

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Assignment 2

Task 3 Individual Task

4. Solve problems (1) Chap 2, page 109, problem 13

Input: weight , height ,age, and the character m for male and f for female

- Chocalte bar = 230 calories

If the calories for m
Then BMR = 66+(6.3*weight)+(12.9*height)-
(6.8*age)
Else the calories for f

Then BMR=655+(4.3*weight)+(4.7*height)-(4.7*age)

- Number of choclate bars = BMR /230
-

Output: number of choclate bars

```cpp
// FCI – Programming 1 – 2018 - Assignment 2
// Program Name: chocolate.cpp
// Last Modification Date: 25/02/2018
// Author1 and ID and Group:20170164
// Teaching Assistant: mohamed atta
// Purpose: calculate calories in choclate
#include <iostream>
using namespace std;
int main()
{
const int CALORIES_PER_chocolate = 230;
int pounds;
int feet, inches;
int age;
char sex;
double bmr;
cout << "Enter your weight in pounds." << endl;
cin >> pounds;
cout << "Enter your height in feet and inches (use the format 'feet inches', e.g. '5 10' for 5 feet and 10 inches)." << endl;
cin >> feet;
cin >> inches;
cout << "Enter your age in years." << endl;
cin >> age;
cout << "Enter M for male or F for female." << endl;
cin >> sex;
if (sex == 'M')
{ }
else
{ }
bmr = 66 +(6.3* pounds)+ (12.9 * (feet * 12 + inches))- (6.8 * age);
bmr = 655 + (4.3 * pounds) + (4.7 * (feet*12 + inches)) - (4.7 * age);
cout << "You need to eat " << (bmr/CALORIES_PER_chocolate) << "chocolate bars to maintain your weight." << endl;
char ch;
cin >> ch;
return 0;
}
```

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Assignment 2

Task 4. Team Task G7 Chap 3, page 174, problem 2

Input
A,b,c

Ax^2+bx+c

X= $-b_{\pm}\sqrt{b2-4ac}$ /2a

The term b^2-4ac is known as the discriminant of quadratic equation
If discriminant is greater than 0 , the roots are real and different
If discriminant equal to zero , the roots are real and equal.
If discriminant less than zero , the roots are complex and different.

If discriminant > 0, root 1 = $-b_{+}\sqrt{b^2-4ac}$ /2a

root 2 = $-b_{-}\sqrt{b^2-4ac}$ /2a

if discrimination= 0 root 1 = root 2 = -b/2a

if discrimination <0 root 1 = -b/2a + i $\sqrt{b^2-4ac}$ /2a
root 2 = -b/2a + i $\sqrt{b^2-4ac}$ /2a

output: root 1,root 2

```cpp
// FCI – Programming 1 – 2018 - Assignment 2
// Program Name: roots.cpp
// Last Modification Date: 25/02/2018
// Author1 and ID and Group:20170164
// Teaching Assistant: mohamed atta
// Purpose:calculate Roots of a Quadratic Equation

#include <iostream>
#include <math.h>

using namespace std;

int main()
{
    float a,b,c,d,root1,root2;
    cout<<"enter value of a,b and c:";
    cin>>a>>b>>c;
    d=b*b-4*a*c;
    if(d==0)
    {
        root1=(-b)/(2*a);
        root2=root1;
        cout<<"roots are real & equal";
    }
    else if(d>0)
    {
        root1=-(b+sqrt(d))/(2*a);
        root2=-(b-sqrt(d))/(2*a);
        cout<<"roots are real & distinct";
    }
    else
    {
        root1=(-b)/(2*a);
        root2=sqrt(-d)/(2*a);
        cout<<"roots are imaginary";

    }


    return 0;
}

```