Programming languages for Bioinformatics
Spring 2019

Homework 2, week 5

1. Bitcount. In the textbook (page 50), there is a function bitcount counting the number of 1-bits in its integer argument.

```
#include <stdio.h>
/* bitcount: count the number of 1-bits in x */
int bitcount (unsigned x) {
   int b;
   for (b = 0; x!=0; x>>= 1) {
      if (x & 01) b++;
   }
   return b;
}

int main(){
   unsigned x = 1023,y=1024;
   printf("Input number:%d\tNumber of 1-bits:%d\n", x, bitcount(x));
   printf("Input number:%d\tNumber of 1-bits:%d\n", y, bitcount(y));
   return 0;
}
```

you can improve the function bitcount by using a different method using the observation that x &=(x-1) will delete the rightmost 1-bit in x. Please explain why x &= (x -1) will delete the right most 1-bit of x, and write a faster version of bitcount.

2. Rewrite the following function *lower*, which converts upper case letter to lower case. Please use a conditional expression(?:) instead of if-else.

```
#include <stdio.h>
/* lower: convert upper case letter to lower case */
int lower (int c) {
   if(c>= 'A' && c<= 'Z')
      return c+'a'-'A';
   else
      return c;
}

int main(){
   char x='T',y='o';
   printf("Input character:%c\tLower case:%c\n", x, lower(x));
   printf("Input character:%c\tLower case:%c\n", y, lower(y));
   return 0; }
```

3. Write a function any(s1, s2), which returns the first location in the string s1 where any character from the string s2 occurs, or -1 if s1 contains no characters from s2. You can use the squeeze() function listed here as your reference.

```
1. /* squeeze: delete all c from s, return the number of deleted letters*/
2. int squeeze (char s[], int c) {
3. int i, j, n = 0;
4. for (i = j = 0; s[i] != '\0'; i++)
5. If (s[i] != c) {
6. s[j++]= s[i];
7. n++;
8. }
9. S[j]= '\0';
10. return n;
11. }
```

For example, we can set s1="This is the main sequence" and s2="subsequence", and your program should return 3, which is the position of 's' in s1 and 's' is the first letter from the s2. You are suggested to write your program like this:

```
/*any(s1, s2):returns the first location in the string s1 where any character from the string s2 occurs, or -1 if s1 contains no characters from s2*/
#include <stdio.h>
int any(s1,s2){
      //your code;
}
int main(){
   char s1[]="This is the main sequence";
   char s2[]="subsequence";
   printf("First location:%d\n",any(s1,s2));
   return 0;
}
```

You need to modify, save, compile, test the code and then report all details including how you test and the test results for each program.

Turning in your homework

Please hand in a hard copy and an electric copy of your homework report, which includes the source code, how you compile it, how you test your program and the result of the test run of you program. Please check the course website to decide how to submit your electric copy. The homework report should be handed in before the class start on April 4th, 2019.

----------cut-----here----------

独立作业承诺：（请选择一个， 并签名）

1. 本人， ，保证本次作业由自己独立完成。

签名

时间　　年　月　日

或者

2. 本人，　　，保证本次作为和 同学讨论后，由自己独立完成。

讨论内容包括

签名 ，

时间　　年　月　日