Question 1 (22 POINTS):

Find the output of the following programs:

I)

```c
#include <stdio.h>
#include <string.h>

int echo (char s[]) {
  if(strlen(s) == 0)
     return 0;
  else {
     printf("%d\n",strlen(s));
     s[strlen(s)/3]='\0';
     return echo (s);
   }
}

main() {
  char s[]="ICS103 Final Exam";
  printf("%d",echo(s));
}
```

OUTPUT

```
17
5
1
0
```

II)

```c
#include <stdio.h>
#include <string.h>
main (){
  char str[]={"This#is#the#final#test"};
  char *token;
  token = strtok(str, "s");
  while ( token != NULL ) {
       puts(token);
       token = strtok( NULL, "s");
  }
}
```

OUTPUT

```
Thi
#i
#the#final#te
t
```

III)

```c
#include <stdio.h>

main() {
  char s[]="KFUPM";
  int i;
  for (i=0;s[i]!='\0';i++) {
      if(i%2==0)
         s[i]=s[i]+1;
      else
         s[i]=s[i]-1;}
      puts(s);
}
```

OUTPUT

```
LEVON
```

> **See Next Page!**

```c
#include <stdio.h>
#include <string.h>
#include <ctype.h>

void test3(char a[]) {
    int i;
    for (i = 0; i < strlen(a); i++)
        a[i]=tolower(a[i]);
}
void test4(char a[], char b[], int n) {
    int i;
    for (i = 0; i < n; i++)
        b[i]=a[i];
}
int main(void) {
    char str1[] = "Ahmad is Tall", str2[] = "MAD", str3[strlen(str2)];
    int i, nf = 1;

    test3(str1);
    test3(str2);

    for(i = 0; i < strlen(str1) && nf; i++){
        test4(&str1[i],str3,strlen(str2));
        nf = strcmp(str3,str2);
    }
    if (nf)
        printf("No\n");
    else
        printf("Yes\n");
    return 0;
}
```

OUTPUT

Yes

```c
#include <stdio.h>
#include <string.h>
#include <ctype.h>

int search( char s[], int st) {
 int i;
 for(i = st - 1; i >= 0;i--) {
   if(isalpha(s[i]))
     return i;
 }
 return -1;
}
main() {
 char line[] = "8A*Z2#m;r<9q+b#";
 int res=search(line,strlen(line));
 while(res != -1) {
   printf("%d\n",res);
   res=search(line,res);
 }
}
```

OUTPUT

13
11
8
6
3
1

Question 2 (12 POINTS):

Write a program that reads a line of characters –including spaces– into a string variable **X** (maximum of 81 characters). Then, it copies to another string **Y** all the non-digit characters in **X**. For example, if **X** = "ICS103 & MATH101", then **Y** = "ICS and MATH".
   – Don't use any loop to read **X**.

```c
#include<stdio.h>
main(){
char X[81],Y[81];
int i, k = -1;
gets(X);
for(i = 0; i < strlen(X); i++)
    if(!isdigit(X[i]))
        Y[++k] = X[i];
Y[k+1] = '\0';
puts(Y);}
```

Question 3 : (17 points)

Write a function coding which receives a string and modifies it as follows:

- All letters are converted to lower case.
- Letters from 'a' to 'x' are modified by adding 2 to each letter i.e. 'a' becomes 'c', 'b' becomes 'd',…., 'x' becomes 'z'. The remaining 2 letters 'y' and 'z' become 'a' and 'b'.
- All remaining characters are not modified.

Put the function definition of coding after the main function. No printing from the function coding.

Your main function will read a string from the user, then it will call the function coding. After that, it will print the modified string as shown below:


```
H:\Sample.exe

Enter a line of text >
This is a sample Quiz!
Coded text > vjku ku c ucorng swkb!
```

See Next Page!

```c
inlcude <stdio.h>
include <string.h>
include <ctype.h>
void coding (char s[]);
int main () {
   char text[50];
   printf("Enter a line of text >\n");
   gets(text);
   coding(text);
   printf("Coded text > ");
   puts(text);
   return 0;
}

void coding (char s[]) {
   int i;
   for(i=0;s[i]!='\0';i++) {
      s[i]=tolower(s[i]);
      if(s[i]>='a' && s[i] <= 'x')
         s[i]=s[i]+2;
      else if (s[i]=='y')
         s[i]='a';
      else if (s[i]=='z')
         s[i]='b';
   }
}
```