20. Write a program to eliminate common sub expressions

Code:

```java
import java.io.*;
import java.util.*;
class subexp_opt
{
public static void main(String args[])throws IOException
{
String s,temp;
String arr[][]=new String[10][2]; //assuming 10 unique operations with LHS and
RHS stored
int flag=0,index=0;
BufferedReader br=new BufferedReader(new InputStreamReader(new
FileInputStream("input.txt")));
File op = new File("output.txt");
if (!op.exists())
op.createNewFile();
BufferedWriter output = new BufferedWriter(new
FileWriter(op.getAbsoluteFile()));
for(;(s=br.readLine())!=null;flag=0)
{
temp=s.substring(s.indexOf("=")+1);
for(int i=0;i<index;i++)
{
if(temp.equals(arr[i][1]))
{
flag=1;
break;
}
else if(temp.contains(arr[i][1]))
s=s.replaceAll(arr[i][1],arr[i][0]);
```

```
}
if(flag==0)
{
arr[index][0]=s.substring(0,s.indexOf("="));
arr[index][1]=temp;
index++;
output.write(s);
output.newLine();
}
}
output.close();
}
}
```

Input:

```
temp1=a-b
temp2=a-b+c
temp3=d-e
temp4=c
temp5=d-e
```

Output:

```
temp1=a-b
temp2=temp1+c
temp3=d-e
temp4=c
```

21. Write a program to perform loop unrolling

Code:

```c
#include<stdio.h>

#include<conio.h>

void main() {
 unsigned int n;
 int x;
 char ch;
 clrscr();
 printf("\nEnter N\n");
 scanf("%u", & n);
 printf("\n1. Loop Roll\n2. Loop UnRoll\n");
 printf("\nEnter ur choice\n");
 scanf(" %c", & ch);
 switch (ch) {
 case '1':
  x = countbit1(n);
  printf("\nLoop Roll: Count of  1's    : %d", x);
  break;
 case '2':
  x = countbit2(n);
  printf("\nLoop UnRoll:  Count of 1's  :  %d", x);
  break;
 default:
  printf("\n Wrong Choice\n");

 }
 getch();
}
int countbit1(unsigned int n) {
 int bits = 0, i = 0;
```

```c
  while (n != 0) {
    if (n & 1) bits++;
    n >>= 1;
    i++;
  }
  printf("\n no of iterations  %d", i);
  return bits;
}
int countbit2(unsigned int n) {
  int bits = 0, i = 0;
  while (n != 0) {
    if (n & 1) bits++;
    if (n & 2) bits++;
    if (n & 4) bits++;
    if (n & 8) bits++;
    n >>= 4;
    i++;
  }
  printf("\n no of iterations  %d", i);
  return bits;
}
```

Output:

Enter N
3
1. Loop Roll
2. Loop UnRoll

Enter ur choice
2

no of iterations 1
Loop UnRoll: Count of 1's :2