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Q1. Write a program that will take three numbers from keyboard and find the maximum of these numbers. Then check whether the maximum number is even or odd.

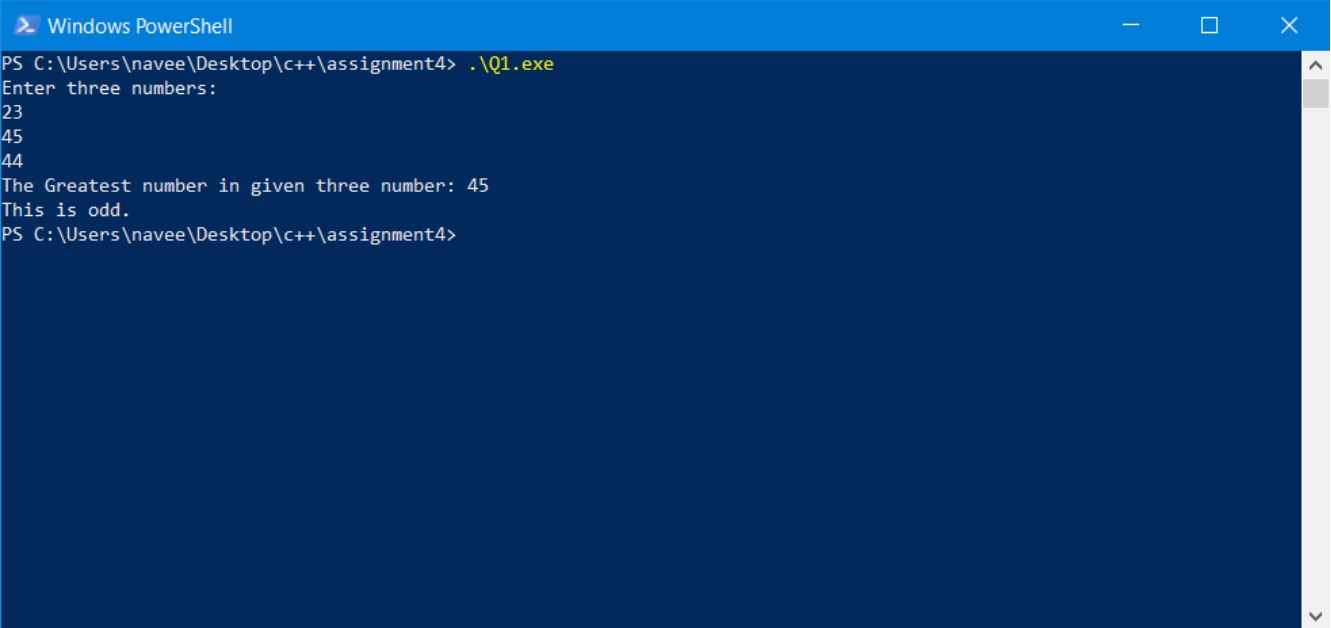
Code:

```
//862041_Naveen Kumar Tyagi_Section F
#include<iostream>
using namespace std;
int main(){
    int num1,num2,num3,gr,rm;    //declaration of required variables
    cout<<"Enter three numbers: \n";
    cin>>num1>>num2>>num3;    //store entered numbers

    //if else statements to find the greatest number in given three
    if((num1>num2)&&(num1>num3)){
        gr=num1;
    }
    else if((num2>num1)&&(num2>num3)){
        gr=num2;
    }
    else if((num3>num1)&&(num3>num2)){
        gr=num3;
    }
    cout<<"The Greatest number in given three number: "<<gr<<endl; //print greatest
number

    //to find whether the greatest number is even or odd and print
    rm=gr%2;
    if(rm==0){
        cout<<"This is even.";
    }
    else{
        cout<<"This is odd.";
    }
    return 0;
}
```

## Output:



```
Windows PowerShell
PS C:\Users\navee\Desktop\c++\assignment4> .\Q1.exe
Enter three numbers:
23
45
44
The Greatest number in given three number: 45
This is odd.
PS C:\Users\navee\Desktop\c++\assignment4>
```

The screenshot shows a Windows PowerShell window with a blue title bar. The command prompt shows the execution of a C++ program named Q1.exe. The program prompts the user to enter three numbers: 23, 45, and 44. It then outputs the greatest number, 45, and states that it is odd. The window has standard Windows window controls (minimize, maximize, close) in the title bar.

Q2. There are 9000 people in a town whose population increases by 15% each year. Write a program that displays the annual population and determines the number of years it will take for the population to surpass 50000.

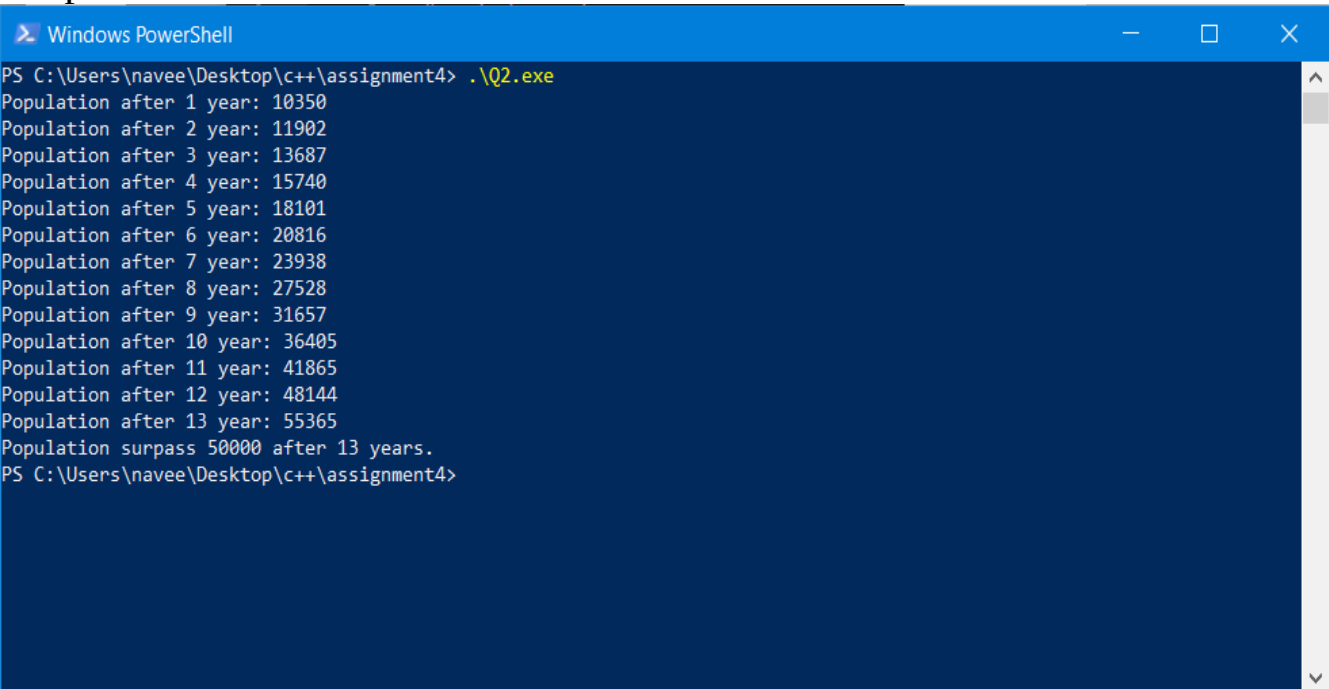
Code:

```
//862041_Naveen Kumar Tyagi_Section F
#include<iostream>
using namespace std;
int main(){
    int population=9000; //declaration of variable population to store population
    int year=0;          //declaration of variable year
    float rate=0.15;     //rate of population increament

    //while loop for printing population in successive years till population surpass 50000
    while(population<=50000){
        year++;
        population=population*(1+rate);
        cout<<"Population after "<<year<<" year: "<<population<<endl;

    }
    cout<<"Population surpass 50000 after "<<year<<" years.";
    return 0;
}
```

## Output:



```
PS C:\Users\namee\Desktop\c++\assignment4> .\Q2.exe
Population after 1 year: 10350
Population after 2 year: 11902
Population after 3 year: 13687
Population after 4 year: 15740
Population after 5 year: 18101
Population after 6 year: 20816
Population after 7 year: 23938
Population after 8 year: 27528
Population after 9 year: 31657
Population after 10 year: 36405
Population after 11 year: 41865
Population after 12 year: 48144
Population after 13 year: 55365
Population surpass 50000 after 13 years.
PS C:\Users\namee\Desktop\c++\assignment4>
```

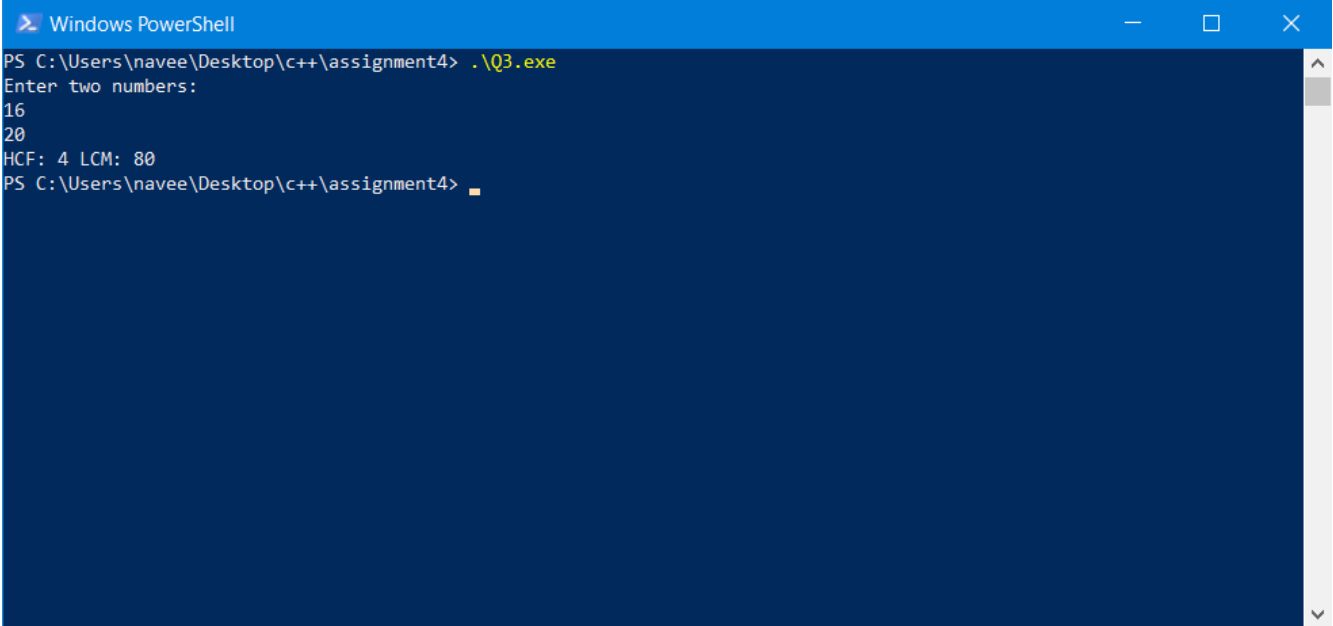
Q3. Find the gcd and lcm of given two numbers.

Code:

```
//862041_Naveen Kumar Tyagi_Section F
#include<iostream>
using namespace std;
int main(){
    int num1,num2,min,hcf,lcm;        //declaration of variables
    cout<<"Enter two numbers: \n";
    cin>>num1>>num2;                //store entered number in num1 and num2

    //if else statement to determine which is minimum
    //HCF is smaller than or equal to the minimum
    if(num1<=num2){
        min=num1;}
    else{
        min=num2;
    }
    //for loop for finding HCF of two numbers
    for(int i=1;i<=min;i++){
        if((num1%i==0)&&(num2%i==0)){
            hcf=i;
        }
    }
    //formula for calculating lcm of the two numbers
    lcm=(num1*num2)/hcf;
}
cout<<"HCF: "<<hcf<<" LCM: "<<lcm;
return 0;
}
```

## Output:



```
Windows PowerShell
PS C:\Users\navee\Desktop\c++\assignment4> .\Q3.exe
Enter two numbers:
16
20
HCF: 4 LCM: 80
PS C:\Users\navee\Desktop\c++\assignment4> 
```

The image shows a Windows PowerShell terminal window with a blue title bar. The window title is "Windows PowerShell". The command prompt shows the user is in the directory "C:\Users\navee\Desktop\c++\assignment4". The user has executed the command ".\Q3.exe". The program prompts the user to "Enter two numbers:". The user has entered "16" and "20" on separate lines. The program has calculated and displayed "HCF: 4 LCM: 80". The prompt "PS C:\Users\navee\Desktop\c++\assignment4> " is shown again at the bottom, indicating the program has finished execution.

Q4. Write a program to get following output.

```

ABCDEFGFGFEDCBA
ABCDEF FEDCBA
ABCDE EDCBA
ABCD DCBA
ABC CBA
AB BA
A A

```

```

      1
    1 1
  1 2 1
1 3 3 1
1 4 6 4 1
  1 3 3 1
    1 2 1
      1 1
        1

```

```

      *
    * * *
  * * * * *
* * * * * * *
  * * * * *
    * * *
      *

```

Code:

```
//862041_Naveen Kumar Tyagi_Section F
```

```
#include<iostream>
```

```
using namespace std;
```

```
int main(){
```

```
    //variables are declared in the scope in which they are required
```

```
    //to print first pattern
```

```
    int num=6;
```

```
    char ch;
```

```
    //print first row of first pattern
```

```
    //65 is ASCII value of A
```

```
    for(int i=65;i<=65+num;i++){    //print A to G
```

```
        ch=i;
```

```
        cout<<ch;
```

```
    }
```

```
    for(int i=65+num-1;i>=65;i--){    //print F to A
```

```
        ch=i;
```

```
        cout<<ch;
```

```
    }
```

```
    cout<<endl;
```

```
    //print rest of rows of first pattern
```

```
    for(int j=1;j<=num;j++){
```

```
        for(int i=65;i<=65+num-j;i++){    // this print A...
```

```
            ch=i;
```

```
            cout<<ch;
```

```
        }
```

```

for(int space=1;space<=2*j-1;space++){ //this is for space
    cout<<" ";
}
for(int i=65+num-j;i>=65;i--){ //this print in reverse
    ch=i;
    cout<<ch;
}
cout<<endl;
}
cout<<endl;

```

```

//to print second pattern
int row1=5;
//for upper half of the second pattern
for(int i=0;i<row1;i++){
    int value=1;
    for(int space=row1;space>=i;space--){ //for printing required space before
each row
        cout<<" ";
    }
    for(int j=0;j<=i;j++){ //for printing values
        cout<<" "<<value<<" ";
        value=value*(i-j)/(j+1);
    }
    cout<<endl;
}
//for lower half of the second pattern
for(int i=row1-2;i>=0;i--){
    int value=1;
    for(int space=i;space<=5;space++){ //for printing required space before each
row
        cout<<" ";
    }
    for(int j=0;j<=i;j++){ //for printing values
        cout<<" "<<value<<" ";
        value=value*(i-j)/(j+1);
    }
    cout<<endl;
}
cout<<endl;

```



```

//to print third pattern
int row2=5;
//for upper half of the third pattern
for(int i=1;i<row2;i++){
    for(int space=i;space<row2;space++){        //for printing required space before
each row
        cout<<" ";
    }
    for(int star=1;star<=2*i-1;star++){        //for printing star
        cout<<" * ";
    }
    cout<<endl;
}
//for lower half of the third pattern
for(int i=row2-2;i>0;i--){
    for(int space=i;space<row2;space++){        //for printing required space before
each row
        cout<<" ";
    }
    for(int star=2*i-1;star>0;star--){        //for printing star
        cout<<" * ";
    }
    cout<<endl;
}
return 0;
}

```

## Output:

```
Windows PowerShell
PS C:\Users\navee\Desktop\c++\assignment4> .\Q4.exe
ABCDEFGFEDCBA
ABCDEF FEDCBA
ABCDE EDCBA
ABCD DCBA
ABC CBA
AB BA
A A

      1
    1 1
  1 2 1
1 3 3 1
1 4 6 4 1
  1 3 3 1
    1 2 1
      1 1
        1

      *
    * * *
  * * * * *
* * * * * * *
  * * * * *
    * * *
      *
```

PS C:\Users\navee\Desktop\c++\assignment4> █

Q5. Given 3-angles. write a program to check whether they form a triangle or not ( $A+B+C = 180$ ). If yes check whether triangle is scalene, equilateral, isosceles or right angled triangle.

Code:

```
//862041_Naveen Kumar Tyagi_Section F
```

```
#include<iostream>
```

```
using namespace std;
```

```
int main(){
```

```
    float ang1,ang2,ang3;        //variable declaration for storing angles
```

```
    cout<<"Enter three angles: \n";
```

```
    cin>>ang1>>ang2>>ang3;
```

```
    if(ang1+ang2+ang3==180){                //check whether the angles form triangle or not
```

```
        cout<<"They will form triangle. ";
```

```
        //if statement to tell triangle is equilateral if it is
```

```
        if((ang1==ang2)&&(ang1==ang3)&&(ang2==ang3)){
```

```
            cout<<"\nThe triangle will be equilateral.";
```

```
        }
```

```
        //else if statement to tell triangle is scalene or right angled
```

```
        else if((ang1!=ang2)&&(ang1!=ang3)&&(ang2!=ang3)){
```

```
            if((ang1==90)||(ang2==90)||(ang3==90)){
```

```
                cout<<"\nThe triangle will be right-angled.";
```

```
            }
```

```
            else{
```

```
                cout<<"\nThe triangle will be scalene.";
```

```
            }
```

```
        }
```

```
        //else if statement to tell triangle is isosceles or right angled isosceles
```

```
        else if((ang1==ang2)||(ang2==ang3)||(ang1==ang3)){
```

```
            if((ang1==90)||(ang2==90)||(ang3==90)){
```

```
                cout<<"\nThe triangle will be right-angled isosceles.";
```

```
            }
```

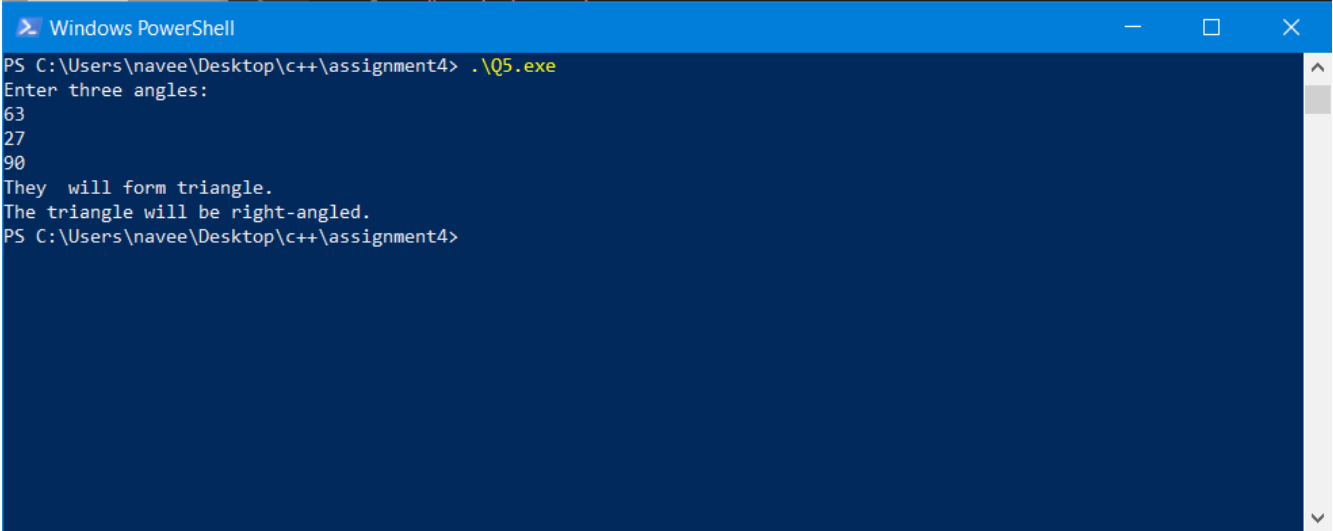
```
            else{
```

```
                cout<<"\nThe triangle will isosceles.";
```

```
            }
```

```
    }  
  }  
  else{  
    cout<<"They will not form triangle. ";  
  }  
  return 0;  
}
```

## Output:



```
Windows PowerShell
PS C:\Users\navee\Desktop\c++\assignment4> .\Q5.exe
Enter three angles:
63
27
90
They will form triangle.
The triangle will be right-angled.
PS C:\Users\navee\Desktop\c++\assignment4>
```

Q6. Write a program to print all the ASCII values and their equivalent characters using a while loop.

Code:

```
//862041_Naveen Kumar Tyagi_Section F
```

```
#include<iostream>
```

```
using namespace std;
```

```
int main(){
```

```
    //declaration of required variables
```

```
    int i=0;
```

```
    char ch;
```

```
    //while loop to print ascii values and their equivalent characters till 99
```

```
    while(i<=99){
```

```
        ch=i;
```

```
        cout<<i<<" "<<ch<<" ";
```

```
        i++;
```

```
    }
```

```
    cout<<endl;
```

```
    //while loop to print ascii values and their equivalent characters from 100 to 256
```

```
    while(i<=256){
```

```
        ch=i;
```

```
        cout<<i<<" "<<ch<<" ";
```

```
        i++;
```

```
    }
```

```
    return 0;
```

```
}
```

## Output:

```
Windows PowerShell
PS C:\Users\navvee\Desktop\c++\assignment4> .\Q6.exe
0 1 2 3 4 5 6 7 8 9 10
14 ¢ 15 ¢ 16 ► 17 ◄ 18 ¢ 19 !! 20 ¶ 21 § 22 − 23 ¢ 24 ↑ 25 ↓ 26 → 27 ← 28 ₧ 29 ⇨ 30 ▲ 31 ▼ 32  33 !
34 " 35 # 36 $ 37 % 38 & 39 ' 40 ( 41 ) 42 * 43 + 44 , 45 - 46 . 47 / 48 0 49 1 50 2 51 3 52 4 53 5
54 6 55 7 56 8 57 9 58 : 59 ; 60 < 61 = 62 > 63 ? 64 @ 65 A 66 B 67 C 68 D 69 E 70 F 71 G 72 H 73 I
74 J 75 K 76 L 77 M 78 N 79 O 80 P 81 Q 82 R 83 S 84 T 85 U 86 V 87 W 88 X 89 Y 90 Z 91 [ 92 \ 93 ]
94 ^ 95 _ 96 ` 97 a 98 b 99 c
100 d 101 e 102 f 103 g 104 h 105 i 106 j 107 k 108 l 109 m 110 n 111 o 112 p 113 q 114 r
115 s 116 t 117 u 118 v 119 w 120 x 121 y 122 z 123 { 124 | 125 } 126 ~ 127 ¢ 128 Ç 129 ü
130 é 131 â 132 ä 133 à 134 å 135 ç 136 ê 137 ë 138 è 139 ì 140 í 141 ï 142 Ä 143 Å 144 É
145 æ 146 Æ 147 ô 148 ö 149 ò 150 û 151 ù 152 ÿ 153 Ö 154 Ü 155 ø 156 £ 157 ¥ 158 ₰ 159 ¢
160 á 161 í 162 ó 163 ú 164 ñ 165 Ñ 166 ã 167 ¢ 168 ¢ 169 ¢ 170 ¢ 171 ¼ 172 ½ 173 ¡ 174 «
175 » 176 ¼ 177 ½ 178 ¾ 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 |
190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 |
205 = 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 |
220 ■ 221 ■ 222 ■ 223 ■ 224 α 225 β 226 Γ 227 π 228 Σ 229 σ 230 μ 231 τ 232 φ 233 θ 234 Ω
235 δ 236 ∞ 237 φ 238 ε 239 η 240 ≡ 241 ± 242 ≥ 243 ≤ 244 ∫ 245 ∫ 246 ÷ 247 ≈ 248 ° 249 ·
250 · 251 √ 252 ° 253 ² 254 ■ 255  256
PS C:\Users\navvee\Desktop\c++\assignment4>
```

Q7. Write a program that accepts a year written as a four-digit numeral and outputs the year written in Roman numerals. Important Roman numerals are I-1 , II-2 , III-3 , IV=4 V –5 , X-10 , L-50 , C-100, D-500 and M-1,000.

Code:

```
//862041_Naveen Kumar Tyagi_Section F
#include<iostream>
using namespace std;
int main(){
    //variables declaration
    //rm_num is to print roman number that times the number is stored in it
    //rem is remainder
    int year,rm_num,rem;

    cout<<"Enter year in four digits: ";
    cin>>year;

    //while loops to print year in roman numbers involving if else statements
    while(rem>=1000){           //this deals with the digit that is at thousand's place
        rm_num=year/1000;
        for(int i=1;i<=rm_num;i++){
            cout<<"M";
        }
        rem=year%1000;
    }
    while(rem>=500){           //this deals with the digit that is at hundred's place
        greater than or equal to 5
        if(rem>=900){
            cout<<"CM";
            rem=rem-900;
        }
        else{
            rm_num=rem/500;
            for(int i=1;i<=rm_num;i++){
                cout<<"D";
            }
            rem=rem%500;
        }
    }
    while(rem>=100){           //this deals with the digit that is at hundred's place less
        than 5
```



```

    if(rem>=400){
        cout<<"CD";
        rem=rem-400;
    }
    else{
        rm_num=rem/100;
        for(int i=1;i<=rm_num;i++){
            cout<<"C";
        }
        rem=rem%100;
    }
}

while(rem>=50){           //this deals with the digit that is at ten's place greater
than or equal to 5
    if(rem>=90){
        cout<<"XC";
        rem=rem-90;
    }
    else{
        rm_num=rem/50;
        for(int i=1;i<=rm_num;i++){
            cout<<"L ";
        }
        rem=rem%50;
    }
}

while(rem>=10){           //this deals with the digit that is at ten's place less
than 5
    if(rem>=40){
        cout<<"XL";
        rem=rem-40;
    }
    else{
        rm_num=rem/10;
        for(int i=1;i<=rm_num;i++){
            cout<<"X";
        }
        rem=rem%10;
    }
}

while(rem>=5){           //this deals with the digit that is at one's place greater
than or equal to 5

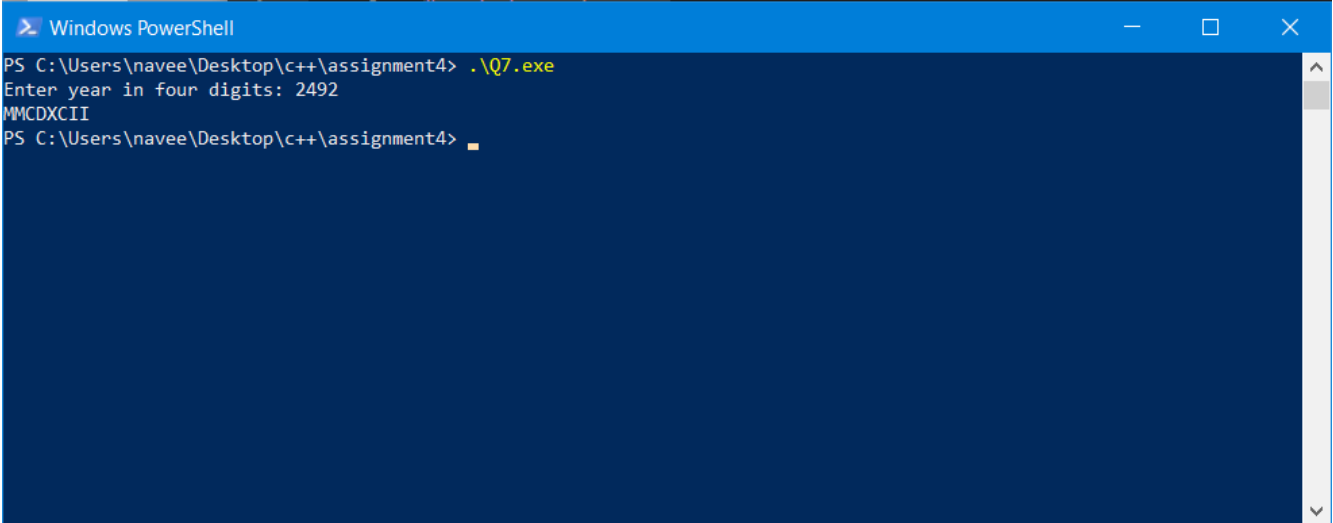
```

```
if(rem>=9){
    cout<<"IX";
    rem=rem-9;
}
else{
    rm_num=rem/5;
    for(int i=1;i<=rm_num;i++){
        cout<<"V";
    }
    rem=rem%5;
}
}
```

//if else statements that deals with digit at one's place less than 5

```
if(rem==4){
    cout<<"IV";
}
else{
    for(rem=rem;rem>0;rem--)
        cout<<"I";
}
return 0;
}
```

## Output:



```
Windows PowerShell
PS C:\Users\ navee\Desktop\c++\assignment4> .\Q7.exe
Enter year in four digits: 2492
MMCDXCII
PS C:\Users\ navee\Desktop\c++\assignment4> 
```

The screenshot shows a Windows PowerShell window with a blue title bar. The command prompt shows the execution of a program named Q7.exe. The user enters the year 2492, and the program outputs the Roman numeral MMCDXCII. The window has standard Windows window controls (minimize, maximize, close) in the title bar.