Task:2

Problem-02:

A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1.

1. What is the actual bit string transmitted?
2. Suppose the third bit from the left is inverted during transmission. How will receiver detect this error?

```
#include <bits/stdc++.h>
using namespace std;

string findXor(string a, string b) {
string result = "";
for (int i = 1; i < b.length(); i++)
result += (a[i] == b[i]) ? '0' : '1';
return result;
}

string mod2div(string dividend, string divisor) {
int pick = divisor.length();
string tmp = dividend.substr(0, pick);
while (pick < dividend.length()) {
if (tmp[0] == '1')
tmp = findXor(divisor, tmp) + dividend[pick];
else
tmp = findXor(string(pick, '0'), tmp) + dividend[pick];
pick++;
}
if (tmp[0] == '1')
tmp = findXor(divisor, tmp);
else
tmp = findXor(string(pick, '0'), tmp);
return tmp;
}

string encodeData(string data, string key) {
int n = key.length();
string appended = data + string(n - 1, '0');
string remainder = mod2div(appended, key);
return data + remainder;
}

int receiver(string code, string key) {
string remainder = mod2div(code, key);
return remainder.find('1') == string::npos;
}

int main() {
```

```
string data = "10011101";
string key = "1001"; // x^3 + 1

cout << "Sender Side:\n";
string code = encodeData(data, key);
cout << "Data: " << data << "\n";
cout << "Key: " << key << "\n";
cout << "Transmitted (Encoded) Data: " << code << "\n\n";

cout << "Receiver Side:\n";
if (receiver(code, key))
cout << "Data is correct (No errors)\n";
else
cout << "Data is incorrect (Error detected)\n";

// Simulate bit error (flip 3rd bit)
string corrupted = code;
corrupted[2] = (corrupted[2] == '1') ? '0' : '1';
cout << "\nCorrupted Data: " << corrupted << "\n";
if (receiver(corrupted, key))
cout << "Receiver: No error detected\n";
else
cout << "Receiver: Error detected!\n";

return 0;
}
```

Output