



## LABWORK 4

Write MATLAB functions with the following descriptions:

**CRCEncode:** Given a binary vector `msg`, and a generator polynomial `gen`, the program encodes the vector to `msg2` using CRC encoding.

**CRCDecode:** The inputs are a binary vector `msg2` and a generator polynomial `gen`. The vector `msg2` was encoded using CRC encoding. If there are no errors, the program decodes the vector to obtain `msg`. If there is any error, the output is a vector of correct length consisting of  $-1$ 's

# CRCEncode

```
function msg2 = CRCEncode(msg, gen)
%This function encodes the message (msg) using
%CRC encoding with the given generator polynomial (gen)
%Written by: Emre Sermutlu on 24.03.2015

n = size(gen,2) - 1;
msg = [msg zeros(1,n)];

[Q,R] = deconv(msg, gen);
R = mod(R,2);

k = size(msg,2)-size(R,2);
R = [zeros(1,k) R];

msg2 = msg + R;

end
```

# CRCDecode

```
function msg = CRCDecode(msg2, gen)
%This function decodes the message (msg2) which was encoded
%using CRC encoding with the given generator polynomial (gen)
%If there is an error, it returns a msg vector of correct length
%but it consists of zeros
%Written by: Emre Sermutlu on 01.04.2015

[Q,R] = deconv(msg2, gen);
R = mod(R,2);

test = 0;

for i = 1:size(R,2);
    if R(i) ~= 0
        test = 1;
        break;
    end
end

m = size(msg2,2) - size(gen,2) + 1;
msg = (-1)*ones(1,m);
if test == 0
    for i = 1:m
        msg(i) = msg2(i);
    end
end

end
```