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G = [1 0 0 0 1 1 0;
      0 1 0 0 1 0 1;
      0 0 1 0 0 1 1;
      0 0 0 1 1 1 1];

P = G(:,5:7);

H = [P' eye(3)];

msg = [1 0 1 1];

code = mod(msg * G, 2);

r = code;

r(3) = mod(r(3)+1,2);

fprintf('Received word: '); disp(r);

s = mod(H * r', 2);

fprintf('Syndrome: '); disp(s');

if all(s == 0)

    disp('No error detected.');

else

    for j = 1:size(H,2)

        if isequal(H(:,j), s)

            err_pos = j;

            break;

        end

    end

    fprintf('Error detected at bit position: %d\n', err_pos);

    e = zeros(1, size(H,2));

    e(err_pos) = 1;

    fprintf('Error vector: '); disp(e);

    r_corr = mod(r + e, 2);

    fprintf('Corrected codeword: '); disp(r_corr);

end

```