Table of Contents

Roshan Jaiswal-Ferri

```
%Section - 01
%Aero 446 Quiz 2: 5/15/25
```

Workspace Prep

```
%warning off
format long      %Allows for more accurate decimals
close all;       %Clears all
clear all;       %Clears Workspace
clc;             %Clears Command
```

Variables

```
Re = 6378; %km
Se = 1366; %w/m^2
mu = 398600;
Altgeo = 35687;
Rgeo = 42164; %km

f = 40e9; %Frequency in Hz
b = 10e6; %50 mhz
c = 3e8; %Speed of light in m/s
lambda = c / f; % Wavelength in meters
eta = 0.55;
OBO = 1; %dB
Ll = 1;
Ptx = 10*log10(60); %W to dB

tatmosphere = 100; %km
lookangle = 5; %deg
Cn = 3; %from problem


%EIRP = Cn - (Gr/Ts) + Ls - 228.6 - (10*log10(b));
```

Problem 1

```
Gtx = 1; %not stated
EIRP = Ptx * Gtx * OBO *Ll

Ls = (tatmosphere/sind(lookangle))*0.065 %db Total path loss

Ttx = 290;
Trx = ((10^(3/10))-1)*Ttx; %Ground system noise temp in K
Ts = 10*log10(Ttx + Trx)

syms Gr
eq = Cn == EIRP + (Gr/Ts) - Ls + 228.6 - (10*log10(b));
soln = solve(eq,Gr);
Gr = double(soln) %ground system gain for C/N of 3 dB

G = (10^(20/10));
syms A
eq2 = G == 4*pi*A*eta/lambda^2;
soln2 = solve(eq2,A);
A = double(soln2);

d = sqrt(2*pi*A)


EIRP =

  17.781512503836435


Ls =

  74.579136096854057


Ts =

  27.623979978989560


Gr =

    -2.729314867743072e+03


d =

   0.071509694193419
```

Problem 2

```
% False
% False
% False
% False
% True
```

Problem 3

```
Codebook = [00     00000;
    01     00101;
    10     10111;
    11     01111;];

Data = Codebook(:,1);
Words = Codebook(:,2);

Code1 = '00000';
Code2 = '00101';
Code3 = '10111';
Code4 = '01111';



Data1 = '00101';
Data2 = '10101';
Data3 = '10111';
Data4 = '11111';
Data5 = '01111';
Data6 = '00001';

check2 = check(Data2,Code1,Code2,Code3,Code4);
check4 = check(Data4,Code1,Code2,Code3,Code4);
check6 = check(Data6,Code1,Code2,Code3,Code4);
```

Functions

```
function out = check(data,code1,code2,code3,code4)
ham1 = 0;
ham2 = 0;
ham3 = 0;
ham4 = 0;
    for i = 1:length(data)
      digit_char = data(i); % Extract each character (digit) from the
character array
      check_dig1 = code1(i);
      check_dig2 = code2(i);
      check_dig3 = code3(i);
      check_dig4 = code4(i);

      if strcmp(check_dig1,digit_char) == 0
```

```
            ham1 = ham1 + 1;
        end

        if strcmp(check_dig2,digit_char) == 0
            ham2 = ham2 + 1;
        end

        if strcmp(check_dig3,digit_char) == 0
            ham3 = ham3 + 1;
        end

        if strcmp(check_dig4,digit_char) == 0
            ham4 = ham4 + 1;
        end

    end
      ham = [ham1,ham2,ham3,ham4];
      disp(ham)
      out = ham;

      %[~, out] = min(ham); %finds the position of smallest ham
end
```

```
     3     1     1     3

     5     3     1     1

     1     1     3     3
```

Published with MATLAB® R2024b