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In [ ]: ## Problem 6
from math import erfc, log2, sqrt

M = 256
Pb = 10e-8

EbNo = 6
Pb_solved = 1
while Pb_solved > Pb:
    EbNo += 1
    Pb_solved = (4 / log2(M)) * ((sqrt(M) - 1) / (sqrt(M))) * erfc(EbNo * 3 * log2(M) /
print(f"Pb = {Pb_solved}")
print(f"Eb/No = {EbNo}")

Pb = 9.804960818109911e-08
Eb/No = 39
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In [ ]: from math import pi, log10
f = 4e9
wavelength = 3e8/f
Teq = 400
TeqdB = 10*log10(Teq)
Pt = 10
PtdB = 10*log10(Pt)
Gt = 20 # dB
Gr = 20 #dB
k = 1.38e-23
kdB = 10*log10(k)
L = 7
LdB = 10*log10(L)

other_factors = PtdB + Gt + Gr - TeqdB - kdB + LdB
print(other_factors)

261.03158962285056
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In [ ]: Rb = 12.96e6 * log2(256) / 2
CNo = EbNo * Rb
CNodB = 10*log10(CNo)
squaredB = CNodB - other_factors
squared = 10**(squaredB/10)
R = wavelength / (4 * pi * sqrt(squared))
print(R)

1494741.4591402514
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