1. Weakest in-cell power level is P(R), while the co-channel interference level is P(D), where $D/R = (3N)^{1/2}$ and N = 13. So $P(D)/P(R) = (D/R)^{-n} = (3N)^{-n/2} = (39)^{-n/2}$ is −28 dB or $(n/2)10\log(39) = 28$ and $\mathbf{n} = 5.6/\log(39) = \mathbf{3.52}$

2. For l.o.s. : $G_1G_2\lambda^2/(4\pi d)^2$ For l.o.s. + ground reflection: $G_1G_2h_1^2h_2^2/d^4$ so we need the ratio $P_{los}/P_{gnd} = [\, G_1G_2\lambda^2/(4\pi d)^2 \,] / [\, G_1G_2h_1^2h_2^2/d^4 \,] = \lambda^2d^2 / h_1^2h_2^2(4\pi)^2$ expressed in dB or $20 \log [\, \lambda d / 4\pi h_1h_2 \,]$. At 1.1 GHz, $\lambda = (3/11)$ m, so

P_{los}/P_{gnd} in dB $= 20 \log [\, (3/11)\,(8800) / 4\pi\,(2.2)(13) \,] =$ **16.5 dB**

3. The GOS spec is met if **erlb(12, 7.5) < 0.02** .

4. $D = (4\pi/P)(dP/d\Omega)_{max}$

If the northerly radiation intensity is $(dP/d\Omega)_N$, the southern one is then $0.5(dP/d\Omega)_N$ and the total radiated power is $P = 0.45\,(dP/d\Omega)_N + (0.75)(0.5)(dP/d\Omega)_N = 0.825\,(dP/d\Omega)_N$, while $(dP/d\Omega)_{max} = (dP/d\Omega)_N$, so $\mathbf{D} = 4\pi/0.825 = \mathbf{15.23}$

5. The noise threshold = kTBF + SNR = − 80.0 dBm + SNR = γ needs to be at most at the level such that $z = (\gamma - \mu) / \sigma = [\, \gamma - (-45 \text{ dBm}) \,] / (5.5 \text{ dB})$ is such that Q(z) = 0.98 . From the given data, z = − 2.054 so that max **SNR** = − (2.054)(5.5) + 80 − 45 = **23.7 dB**