AE 4361 Assignment 7

1)

degrees

2) GT = 6289.6 = **+37.9862 dB**

3) GT’ = **+33.0862 dB**

4) rmax = **384,347.2 km**

5) PR/PT = 1.068e-21= **-209.71 dB**

6) PR = -162.60 dB = **-132.60 dBm**

7) GR = +3483.75 = **+35.42 dB**

8) Eb = -187.18 dBJ = **-157.18 dBmJ**

9) N0 = **3.864e-21 W/s = -174.13 dBm/Hz**

10) Eb/N0 = **16.95 dB**

The minimum Eb/N0 for the lowest probability of bit error of 10-6 using BPSK is 10.5 dB. As our signal to noise ratio is above that threshold, and keeping a link margin above 3dB, the required link margin is achieved. We could even reduce the transmitted power as our margin is large.

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| **LRO Link Budget** | | |
| Transmitted Power, PT | 40 | W |
| Transmitted Power, PT | +46.02 | dBm |
| Transmit Antenna Gain, GT | +37.9862 | dB |
| Cable and Beam loss | -4.90 | dB |
| Path Loss, PR/PT | -209.71 | dB |
| Atmosphere Loss | -2.00 | dB |
| Received Power, PR | -132.60 | dBm |
| Received antenna Gain, GR | +35.42 | dB |
| Required CTR, bps | 60 | dBhz |
| Energy per bit, Eb | -157.18 | dBmJ |
| System Noise, N0 | -174.13 | dB/hz |
| Achieved EB/N0 | +16.95 | dB |
| Required EB/N0 | +10.50 | dB |
| **Required Link Margin** | +6.45>**+3.00** | **dB** |