**Question:**

Instead of assuming free space environment in 6.6 assume an urban area cellular radio scenario. Path loss exponent n=3.1 and a transmitter power of 50W.  
a. What is the range of path loss exponent for this environment?  
b. If a transmitter’s power is applied to Unity gain Antenna with 900MHz carrier frequency, what is the free space power in dBm at a free space distance of 100m?

**Answer:**

1. *Range of Path loss exponent in urban area cellular radio scenario is 2.7 – 3.5.*

1. According to Friss’s transmission equation for Free Space:  
   Pr = (Pt \* Gt\* Gr \* λ2)/(4π \* d)2

Pr = (50 \* 1\* 1 \* λ2)/(4π \* 100)2 [λ = c/f => 3\*108/900\*106 => (1/3)]  
Pr = (50 \* 1\* 1 \* (1/3)2)/(4π \* 100)2Pr = 3.51 \* 10-6 W

Pr = 10 · log10( 3.51 \* 10-6 W / 1W) +30

Pr = -24 dBm