Homework # 2 (due April 7)

1.   Consider an LTE base station communicating to mobile subscribers, with the channel parameters :

   path loss exponent $n = 3$; $d_0 = 1\,m$, $\beta_0 = 31\,dB$;

   $\sigma_{dB} = 6\,dB$ for lognormal slow fading.

The following assumptions are made for the communication :

   16-QAM modulation is employed for signal transmission.

   The data rate is 24 Mb/sec .

   Transmit power $P_T = 10$ Watt

The receiver has a noise figure F = 5 dB and requires $E_b/N_0 = 14$ dB

for error- correction purpose .

If the outage probability is required to be less than 5% , what is the service range of this system ?

2. In an office building , a 2.5 GHz transmitter located at a workstation is
   separated from the network access node (receiver) by a distance 40 m .
    The transmitter must pass through 5 m of an office , through a
    plasterboard wall , and then a large open space.
     The propagation is modeled as free space for the first 5m and with a loss
      exponent of 3.1 for the remainder of the distance. The plasterboard wall
     causes 5 dB attenuation of the signal. The isotropic transmitter radiates
      25 dBm power. How much is the power received at the receiver ?