PROBLEM 1

The transmitter (TX) and receiver (RX) of a link operating at 2100 MHz in a urban environment are located at an height of 3 metres above the street level; the buildings “A”, “B” and “C” have an height of 20, 25 and 23 metres respectively; moreover $d=60\text{ m}$, $l=10\text{ m}$ and $w=30\text{ m}$. Calculate the difference (in dB) between the signal received via “over-rooftop-propagation” (continuous line) and that received by diffraction from the corner of building “A” (dashed line). Approximate each building and the corner with a knife edge.
PROBLEM 2

The transmission loss $L$ for an indoor communication system has been experimentally measured as a function of position, and the relative cumulative distribution function (CDF) is plotted in the figure below. You are asked to:

a) calculate the percentage of the area covered if the transmitter’s power is 10 mW and the receiver has a sensitivity of -60 dBm;

b) draw (approximately) on the same figure the CDF of $L$ that is obtained if two uncorrelated antennas are used at the receiver’s end instead of one (antenna diversity).

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PROBLEM 3

A UHF transmitter operating at 900 MHz is located on a tower whose height is $h_1=10$ m above a perfectly conducting ground. The portable receiver, that can be assumed to be at an height $h_2=1.5$ m, has an antenna with a gain of 0 dBi and a sensitivity of -85 dBm. Knowing that the transmitted power is 1 W and that the transmitter antenna gain is 5 dBi, compute the coverage area of the transmitter.