**NET3900: Assignment 7**

These questions are based on Module 7. Submit your answers via Bb by end-of-day Friday November 18, 2016. Always show your calculations or provide explanation for your answers. Always show the units in your answer. The marks value for each question follows the question number.

1/1. What is the difference between dB and dBm?
dB refers to relative power levels such as gain and loss.
dBm refers to absolute power levels

2/5. Convert the following power levels to decibels (dBm). Always show the units in your answer.
a) 1 mW = 0 dBm
b) 1500 mW = 31.7 dBm
c) 25 mW = 14 dBm
d) 0.0045 mW = -23.5 dBm
e) 1 Watt = 1000 mW = 30 dBm

3/4. Convert the following power levels to milliWatts (mW). Always show the units in your answer.
a) 3 dBm = 2 mW
b) 20 dBm = 100 mW
c) 50 dBm = 100,000 mW
d) -25 dBm = 0.003 mW

4/4 Solve the following power equations including the correct units.
(ref: module 7b: slides 6, 13)
a) 10 dB + 15 dB = 25 dB
b) 10 dBm + 15 dB = 25 dBm
c) 20 dBm + 20 dBm = 100 mW + 100 mW = 200 mW = 23 dBm
NOTE: This applies when both values are transmit power levels or both values are receive power levels.
d) 10 dBm - 40 dB = -30 dB

5/2. The power level of an RF signal travelling into a wall is 100 mW. After the RF signal passes through the wall, it exits with a power level of 25 mW. What is the attenuation/loss of the wall in dB? (ref: mod 7b: slide 3)
Loss = 100 mW / 25mW = 4
This is equivalent to 6 dB

6/2. The power level of an RF signal at the input of an RF amplifier is 25 mW. The power level of the RF signal at the output of the amplifier is 100 mW. What is the gain of the amplifier in dB? (ref: mod 7b: slide 3)
Gain = 100mW / 25mW = 4
This is equivalent to 6 dB

7/6. A wireless station is 10 meters away from an Access Point as shown in the diagram. The AP is transmitting a 5.5 GHz Wi-Fi signal at a power level of 15 dBm.

a) What is the value of FSPL (free space path loss) in dB from the AP to the wireless station?
FSPL (dB) = 20 log (r) + 20 log (f) - 27.55  (r in meters; f in MHz)
FSPL = 20 log (10) + 20 log (5500) - 27.5
FSPL = 20 + 74.8 - 27.5 = 67 dB

b) What is the received signal level at the wireless station in dB?
Using the General Power Equation:
Prx = Ptx - FSPL  (Gain is assumed to be 0)
Prx = 15 dBm - 67 dB
Prx = -52 dBm

c) A wall is placed between the AP and the wireless station. The wall has a loss of 10 dB. With the wall, what is the received signal level at the wireless station in dB?
Using the General Power Equation:
Prx = Ptx - FSPL - L(wall)
Prx = 15 dBm -67 dB - 10 dB
Prx = -62