Name: ________________________________

ID: ________________________________

41 pts.

Show all your work. Without proper justification and details of steps, correct answers alone may not carry full credit.

Notes:
  • Minus 3 points if your homework is not stapled in the upper left-hand corner.
  • Minus 2 points if you use the back of your paper. Please only use a single side.
  • Minus 2 points if you present the worked problems out of order. In other words, please present the problems in the order assigned, 1, 2, 3, ...

1. List the four major passive RFID bands. (4 pts.)

2. List the goals and techniques of the ISM bands. (7 pts.)

3. Describe inductive coupling. (2 pts.)

4. A reader dipole antenna is 6.3 cm measured end-to-end. What is the approximate frequency of this system? (5 pts.)

5. Give the center frequency for Gen2’s channels 5, 30, and 45 in the USA. (3 pts.)

6. A system consists of an amplifier, feedline, and antenna in series. For a 25 mV input to the amplifier, the output is 50 mV. The feedline loss is 3 dB. The antenna gain is 4 dBi. What is the overall gain of the system? (5 pts.)

7. Derive the decibel version of the Friis formula. (5 pts.)

8. The reader transmitted power is 150 milliwatts. The gain of the reader antenna is 6 dBi. The tag requires 50 microwatts to operate. The gain of the tag antenna is 1 dBi. For 915 MHz, what is the theoretical maximum distance at which the tag will receive enough power to power its circuits? (5 pts.)

9. A reader antenna has a gain of 15 dBi. To be legal in the USA, what is the maximum power in watts that the reader can transmit? (5 pts.)