713 PS4 Quiz: May 8th, 2006 Name:

Circle the answer that is most correct.

(i) A horizontally polarized transmitter at height 5 m broadcasts at 3 GHz to a receiver at height 1.5 m and 5 km away. Find the received power relative to that in free space assuming a perfectly flat, perfectly conducting ground surface; transmitter and receiver are polarization and impedance matched.

(a) -300 dB (b) -14.5 dB (c) -3.2 dB (d) 1.4 dB (e) 6 dB

(ii) The received power relative to that in free space is measured as a function of receiver height on a 25 km propagation path, first at 2 GHz and then at 1 GHz. At 2 GHz, it is found that the received power relative to free space (the 2 GHz "height gain function") first becomes 0 dB at a receiver height of 100 m. Assuming the dominant propagation mechanism is terrain diffraction, which of the following is likely to be true regarding the 1 GHz "height gain function"?

(a) it probably first becomes 0 dB at a height greater than 100 m
(b) it is likely to be greater than 0 dB at receiver height 100 m
(c) the 1 GHz height gain function will be nearly identical to the 2 GHz height function
(d) it is likely that the 1 GHz height gain function will be nearly constant versus receiver height
(e) insufficient information to answer this question

(iii) It is known that a ray propagating at 300 MHz on a 20 km path is 40 m above the local terrain at a point 10 km from the transmitter. Assuming an earth radius multiplier of 4/3, which of the following is true about this point? Note "precisely" below refers to phases within 1 degree of expectations.

(a) the ray is obstructed at this point
(b) if reflection occured at this point, the reflected ray would be precisely in phase with the direct ray when received
(c) if reflection occured at this point, the reflected ray would be precisely out-of-phase with the direct ray when received
(d) the "Earth bulge" at this point achieves its minimum value along the path
(e) none of the above

(iv) Which of the following statements is true?

(a) the spherical Earth and knife edge diffraction models predict similar received powers in the obstructed region
(b) the method of moments provides a simple and efficient approximate means for computing propagation over terrain, including atmospheric effects
(c) the parabolic equation method requires sampling terrain on the scale of the electromagnetic wavelength (for example, 10 points per electromagnetic wavelength)
(d) the maximum height of the Earth "bulge" depends on the effective Earth radius multiplier
(e) none of the above