

- 2.2 (a.)  $W = 33.16 \text{ a, mW/m}^2$   
 (b.)  $P_{rad} = 4.167 \text{ kW}$
- 2.4 (a.)  $(P_{AVG})_{max} = 6.3662 \text{ } \mu\text{W/m}^2$   
 (b.)  $D_o = 8 = 9.03 \text{ dB}$   
 (c.)  $G_o = e_o D_o = 8 = 9.03 \text{ dB}$  (lossless antenna,  $e_o = 1$ )
- 2.7 (a.)  $D_o = 4 = 6.02 \text{ dB}$ ,  $HPBW(\text{azimuth}) = 120^\circ$ ,  $HPBW(\text{elevation}) = 120^\circ$   
 (b.)  $D_o = 5.09 = 7.07 \text{ dB}$ ,  $HPBW(\text{azimuth}) = 90^\circ$ ,  $HPBW(\text{elevation}) = 120^\circ$   
 (c.)  $D_o = 6 = 7.78 \text{ dB}$ ,  $HPBW(\text{azimuth}) = 74.93^\circ$ ,  $HPBW(\text{elevation}) = 120^\circ$   
 (d.)  $D_o = 4.71 = 6.73 \text{ dB}$ ,  $HPBW(\text{azimuth}) = 120^\circ$ ,  $HPBW(\text{elevation}) = 90^\circ$   
 (e.)  $D_o = 6 = 7.78 \text{ dB}$ ,  $HPBW(\text{azimuth}) = 90^\circ$ ,  $HPBW(\text{elevation}) = 90^\circ$   
 (f.)  $D_o = 7.07 = 8.49 \text{ dB}$ ,  $HPBW(\text{azimuth}) = 74.93^\circ$ ,  $HPBW(\text{elevation}) = 90^\circ$
- 2.11 (a.)  $D_o = 20 = 13.0 \text{ dB}$   
 (b.)  $HPBW(\text{elevation}) = 65.5^\circ$
- 2.13 (a.)  $35 \text{ dB}$   
 (b.)  $56.234$
- 2.17a (a.)  $D_o = 4.09 = 6.11 \text{ dB}$   
 (b.)  $D_o = 5.10 = 7.07 \text{ dB}$   
 (c.)  $D_o = 6.01 = 7.79 \text{ dB}$   
 (d.)  $D_o = 4.74 = 6.76 \text{ dB}$   
 (e.)  $D_o = 6.01 = 7.79 \text{ dB}$   
 (f.)  $D_o = 7.07 = 8.49 \text{ dB}$
- 2.21 (a.)  $D_o = 4.4735$   
 (b.)  $D_o = 4.4735$
- 2.32  $PLF = 0.5$
- 2.39 (a.)  $P_g = 12.442 \text{ mW}$   
 (b.)  $P_r = 7.32 \text{ mW}$   
 (c.)  $P_L = 0.1 \text{ mW}$
- 2.41 (b.)  $P_g = 231 \text{ mW}$   
 (c.)  $P_{rad} = 148 \text{ mW}$
- 2.46 (a.)  $0.765 \angle -18.97^\circ$   
 (b.)  $P_{loss} = 189 \text{ mW}$   
 (c.)  $P_{rad} = 21.36 \text{ W}$   
 (d.)  $e_{rad} = 99\%$
- 2.48  $D_o = 3.125$

2.53 (a.)  $P_i = 4.943 \times 10^{16} \text{ W/m}^2$   
(b.)  $P_r = 8.85 \times 10^{-13} \text{ W}$

2.56 (a.)  $P_r = 82.9 \text{ } \mu\text{W}$   
(b.)  $P_r = 0.829 \text{ } \mu\text{W}$   
(c.)  $P_r = 8.29 \text{ nW}$

2.58  $P_r = 0.253 \text{ W}$

2.62  $P_i = 699 \text{ W}$

2.66  $\sigma = 3142 \text{ m}^2$