Problem Ch. 4	Solution
22a A resonant center-fed dipole is connected to a 50-ohm line. It is desired to maintain the input VSWR=2. What should the largest input resistance of the dipole be to maintain the vswr=2?	100 ohms
23 the radiation field of a particular antenna is given by $E = \hat{\theta}\ j\omega\mu k \sin\theta \frac{I_o A_1 e^{-j\beta r}}{4\pi r} + \hat{\phi}\ \omega\mu \sin\theta \frac{I_o A_2 e^{-j\beta r}}{2\pi r}$ the values A_1 and A_2 depend on the antenna geometry. Obtain an expression for the radiation resistance. What is the polarization of the antenna?	$R_{rad} = \frac{\omega^2\mu^2\left(k^2A_1^2 + 4A_2^2\right)}{6\pi\eta}$ Elliptical since phase difference is j= 90^o and $A_1 \neq A_2$
29 The field radiated by an infinitesimal electric dipole, placed along the z-axis a distance s along the x-axis, is incident upon a waveguide aperture antenna of dimensions a and b, mounted on an infinite ground plane. The normalized e field radiated by the aperture in the E-plane (xz plane, f-0) is given by $E = -\hat{\theta}\ j\omega\mu b \frac{I_o e^{-j\beta r}}{4\pi r} \frac{\sin\left\lvert\frac{kb}{2}\cos\theta\right\rvert}{\frac{kb}{2}\cos\theta}$ Assuming the dipole and aperture antennas are in the far field of each other, determine the polarization loss (in DB) between the two antennas.	PLF= 1 (0dB)
31 A 3-cm long dipole carries a phasor current $I_o = 10e^{j60}$ Assuming that wavelength is 5cm, determine the E- and H-fields at 10 cm away from the dipole and at $\theta = 45^o$	Check: r_{ff}= 3.6cm , so r=10cm is on far field. $E_\theta = 4{,}620\angle 11.52\ \text{V/m}, \left\lvert H_\phi\right\rvert = \frac{\left\lvert E_\theta\right\rvert}{120\pi} = 12.25\ \text{A/m}$
32 The radiation resistance of a thin, lossless linear electric dipole of length $l = 0.6\lambda$ is 120 ohms. What is the input resistance?	Use eq (4.79), R_{in} = 132.7 ohms