Chapter-33

1. A very long, thin rod carries electric charge with the linear density 35.0 nC/m. It lies along the *x* axis and moves in the *x* direction at a speed of 1.50 x 107 m/s. (a) Find the electric field the rod creates at the point (*x* = 0, *y* = 20.0 cm, *z* = 0). (b) Find the magnetic field it creates at the same point. (c) Find the force exerted on an electron at this point, moving with a velocity of (2.40 x 108) $\hat{i}$m/s

1. The distance to the North Star, Polaris, is approximately 6.44 x 1018 m. (a) If Polaris were to burn out today, how many years from now would we see it disappear? (b) What time interval is required for sunlight to reach the Earth? (c) What time interval is required for a microwave signal to travel from the Earth to the Moon and back?

1. At one location on the Earth, the rms value of the magnetic field caused by solar radiation is 1.80 *µ*T. From this value, calculate (a) the rms electric field due to solar radiation, (b) the average energy density of the solar component of electromagnetic radiation at this location, and (c) the average magnitude of the Poynting vector for the Sun’s radiation.

1. A 15.0-mW helium–neon laser emits a beam of circular cross section with a diameter of 2.00 mm. (a) Find the maximum electric field in the beam. (b) What total energy is contained in a 1.00-m length of the beam? (c) Find the momentum carried by a 1.00-m length of the beam.