

## Practice Problems Related to Thomson and Rayleigh Scattering

1. The number density of molecules in the air at sea level is about  $3 \times 10^{19} \text{ cm}^{-3}$ . This is mostly  $\text{N}_2$ , which has 14 electrons, so that number density of electrons is about  $4 \times 10^{20} \text{ cm}^{-3}$ . Assuming that light interacts with the electrons via Thomson scattering, how far would you expect to be able to see at sea level? Explain.
2. Substitute  $x = A \exp(\alpha t)$  into equation (11) in the notes, and thereby derive equations (12) and (13). Explain, qualitatively, the dependence of  $\delta$  on  $\tau$  and  $\omega_0$ .