

1. When calculating the population density of electrons for a metal by using (7.26), a value much larger than immediately expected results. Why does the result, after all, make sense? (Take  $\sigma=5 \times 10^5 \text{ 1}/\Omega \text{ cm}$ ;  $v_F=10^8 \text{ cm/s}$  and  $\tau=3.1 \times 10^{-14} \text{ s}$ ).
2. Consider the conductivity equation obtained from the classical electron theory. According to this equation, a bivalent metal, such as zinc, should have a larger conductivity than a monovalent metal, such as copper, because zinc has about twice as many free electrons as copper. Resolve this discrepancy by considering the quantum mechanical equation for conductivity.