HW 20 #8, 17, 23, 25, 26, 50 Alex Koch

8) $V = IR = \left(\frac{10\text{ma}}{1000\text{ma}}\right) 500 = 5\text{V}$

17) $t = \frac{\text{distance traveled}}{\text{speed of light}} = \frac{\pi d}{3e8}$

$I = \frac{Q}{t}$, $Q = It = 20 \cdot \frac{\pi(72)}{3e8} = 1.5e{-}5\text{ C}$

$\#\text{ of electrons} = \frac{1.5e{-}5\text{ C}}{1.6e{-}19} = 9.42e13\text{ electrons}$

23) $V = IR$, $I = \frac{V}{R} = \left(\frac{200\text{KV}}{1\text{KV}}\right) / 1e9 = 2e{-}4\text{ A}$

25) $R = \frac{\rho L}{A}$

$A = \pi r^2 = \pi\left(\frac{d}{2}\right)^2$

$\rho_{copper} = 1.68e{-}8$

$R = \frac{1.68e{-}8 \cdot (1000\text{m})}{\pi\left(8.252\text{mm}\left(\frac{1\text{m}}{1000\text{mm}}\right)/2\right)^2} = \frac{1.68e{-}8 \cdot 1000}{\pi(8.252e{-}3/2)^2} = 0.314\,\Omega$

26) $R = \frac{\rho L}{A}$, $L = \frac{RA}{\rho}$

$A = \pi r^2 = \pi\left(\frac{d}{2}\right)^2$

$\rho = 5.6\,e^{-8}$

$L = \frac{RA}{\rho} = \frac{0.2 \cdot \pi((0.1/1000)/2)^2}{5.6e{-}8} = 0.028\text{m}$

50) $\frac{1\text{year}}{1\text{year}} \cdot \frac{365\text{ days}}{1\text{day}} \cdot \frac{5.2\text{KW}\cdot\text{hr}}{} = \frac{3650\text{KW}\cdot\text{hr}}{} \cdot \frac{12\text{ cents}}{1\text{KW}\cdot\text{hr}} = 43800\text{cents} = \$438.00\text{ dollars}$