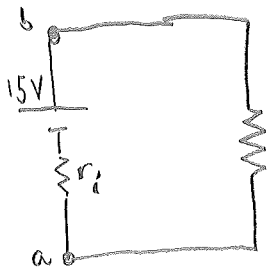
HW Solutions

25.52



$V_{ab} = 11.3\,V$

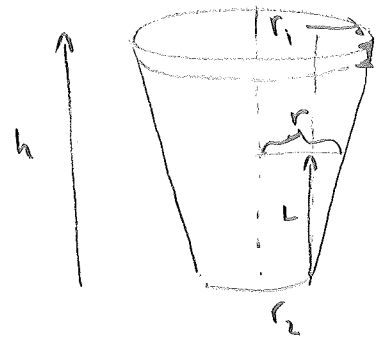
$P = V^2/R = 11.3^2/75 = 1.7\,W.$ (a)

(b) $I = V/R = 11.3/75 = 0.151\,A.$

Volt loop law $+15 - 0.151\times 75 - 0.151 r_i = 0$

$r_i = 24.3\,\Omega$

25.63 (a)



$R = \frac{\rho L}{A}$ so $dR = \rho \frac{dL}{A}$

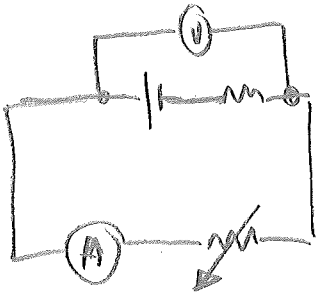
$A = \pi r^2 = \pi\left(r_2 + \frac{L}{h}(r_1 - r_2)\right)^2$

$$R = \int_0^h \frac{\rho\, dL}{\pi\left(r_2 + \frac{L}{h}(r_1 - r_2)\right)^2} = \frac{\rho}{\pi} \left.\frac{-h/(r_1 - r_2)}{\left[r_2 + \frac{L}{h}(r_1 - r_2)\right]}\right|_0^h$$

Because R in series add!

$$= \frac{\rho}{\pi}\frac{h}{(r_2 - r_1)}\left|\frac{1}{r_1} - \frac{1}{r_2}\right| = \frac{\rho h}{\pi r_1 r_2}$$ (b) $\rightarrow \frac{\rho h}{\pi r^2} = \frac{\rho h}{A}$ when $r_1 = r_2$.

25.66



a) max V if $I = 0$, $R = \infty$. no ΔV across r_{int} $V = \mathcal{E}$

min V if $R = 0 \rightarrow V = 0$.

b) Max I if $R = 0$ $I = \mathcal{E}/r_i = 15/4\,A.$

min I if $R = \infty$ $I = 0$