76. (a) We denote $L = 10\,\text{km}$ and $\alpha = 13\,\Omega/\text{km}$. Measured from the east end we have $R_1 = 100\,\Omega = 2\alpha(L - x) + R$, and measured from the west end $R_2 = 200\,\Omega = 2\alpha x + R$. Thus,

$$x = \frac{R_2 - R_1}{4\alpha} + \frac{L}{2} = \frac{200\,\Omega - 100\,\Omega}{4(13\,\Omega/\text{km})} + \frac{10\,\text{km}}{2} = 6.9\ \text{km}\ .$$

(b) Also, we obtain

$$R = \frac{R_1 + R_2}{2} - \alpha L = \frac{100\,\Omega + 200\,\Omega}{2} - (13\,\Omega/\text{km})(10\,\text{km}) = 20\ \Omega\ .$$