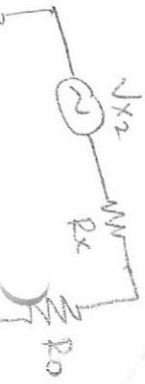

(3) Noise power at input is

$$P_{N,in} = KT\Delta f \qquad \text{(Because attenuator is matched to source)}$$

From (2)

$$P_{N,out} = \frac{1}{R_o}\left\{\frac{\overline{V_s^2}}{4}\frac{(R_o-R_x)^2}{(R_o+R_x)^2} + \frac{\overline{V_{x1}^2}}{4}\frac{(R_o-R_x)^2}{(R_o+R_x)^2} + \frac{\overline{V_{x2}^2}}{4} + \frac{\overline{V_y^2}}{4}\frac{R_o^2}{\left(\frac{R_o+R_x}{2}+R_y\right)^2}\right\}$$

$$= \frac{1}{R_o}\left\{KT\Delta f\,\frac{(R_o+R_x)(R_o-R_x)^2}{(R_o+R_x)^2} + KT\Delta f\,R_x + KT\Delta f\,R_y\frac{R_o^2}{\left(\frac{R_o+R_x}{2}+R_y\right)^2}\right\}$$

$$\Rightarrow P_{N,out} = \frac{KT\Delta f}{R_o}\left[\frac{(R_o-R_x)^2}{R_o+R_x} + R_x + \frac{R_y R_o^2}{\left(\frac{R_o+R_x}{2}+R_y\right)^2}\right]$$

From $R_o = R_x + \dfrac{R_y(R_x+R_o)}{R_y+R_x+R_o} \Rightarrow R_o = R_x\sqrt{1+\dfrac{2R_y}{R_x}}$

Let $R_z = \sqrt{1+\dfrac{2R_y}{R_x}} \Rightarrow R_o = R_z R_o$

$$\Rightarrow = \left[\frac{(R_o-R_x)^2}{R_o+R_x} + R_x + \frac{4R_y R_o^2}{(R_o+R_x+2R_y)^2}\right]$$

$$= \frac{R_x(R_z-1)^2}{R_z+1} + R_x + \frac{R_x^2\,4R_y R_z^2}{R_x^2\left(R_z+1+\frac{2R_y}{R_x}\right)^2}$$

($\frac{2R_y}{R_x} = R_z^2$)

$$= \frac{R_x(R_z-1)^2}{R_z+1} + R_x + \frac{4R_y}{(1+R_z)^2}$$