1. Noise Temperature:

   (a) What is the noise temperature when using a source resistance $R = 10\,\mathrm{k}\Omega$ at $1\,\mathrm{kHz}$.

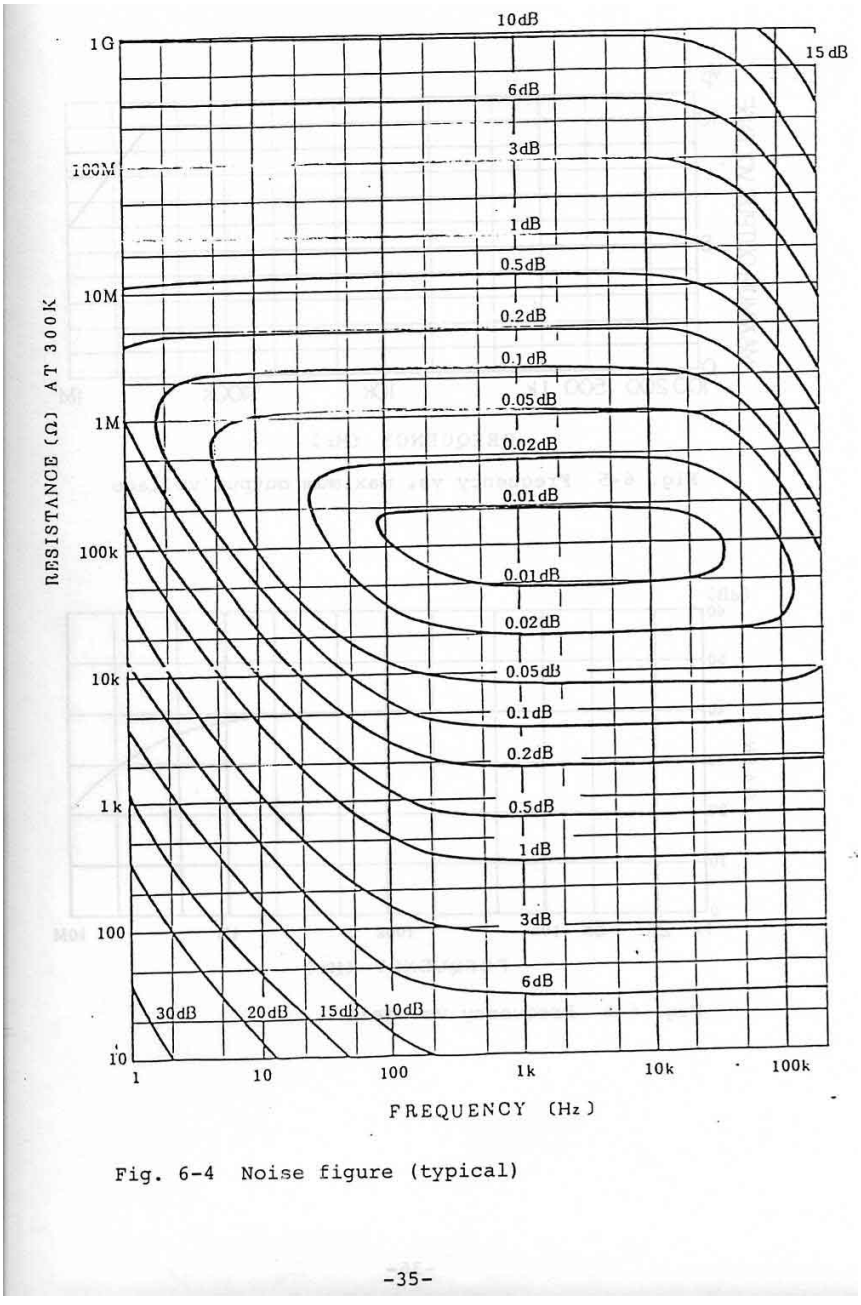

Figure 1: Plot from Model LI-75A low noise preamplifier instruction manual.

(b) What is the noise temperature of a system where the source voltage noise V_n and source current noise I_n are correlated?

2. You connect a source with a cable to an amplifier. Unfortunately, the cable has 3 dB losses. What is the Noise temperature at the input of the amplifier?

3. In the lecture one way to shield a cable was given as show in figure 2. The attenuation to the reference is 80 dB. How does the attenuation change when changing the 1 MΩ impedance to 100 Ω?

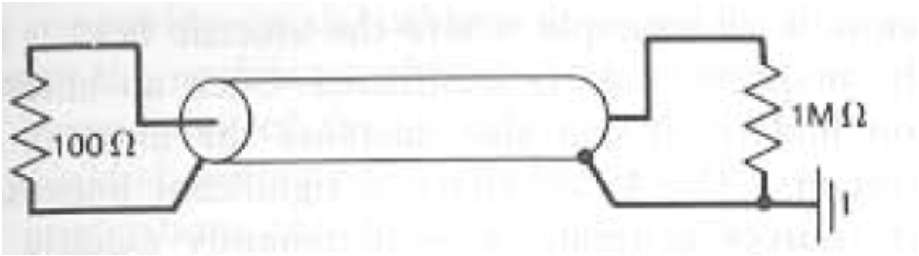

Figure 2: Shielded center conductor.

4. A 50 kHz signal is send through a 30 cm long copper wire with radius $r = 1\,\text{mm}$. This copper has a RRR=1000, $\mu_{Cu} = 1.256 \cdot 10^{-6}\,\text{H/m}$ and RT resistivity $\rho_{RT} = 1.68 \cdot 10^{-8}\,\Omega\text{m}$.

   (a) Calculate the Skin depth at RT and 4 K.

   (b) What is the AC resistance at these temperatures?

   (c) What implications does this have for grounding at higher frequencies?