$$\text{Noise Factor} = \frac{\text{Signal In}}{\text{Noise In}} \div \frac{\text{Signal Out}}{\text{Noise Out}} = \frac{\text{Signal In}}{\text{Signal Out}} \times \frac{\text{Noise Out}}{\text{Noise In}}$$

$$\text{Noise Power} = K \times \text{Temperature} \times \text{Bandwidth}$$

$$\text{Noise Factor} = \frac{\text{Noise Power Out}}{\text{K x Temperature x Bandwidth}}$$

$$\text{Noise Figure (dB)} = 10 \text{ x Log(Noise Factor)}$$

$$\text{Noise Figure (dB)} = 10 \text{ x Log}\left(\frac{T2 - T0}{T0}\right) - 10 \text{x} \log\left(\frac{N2}{N1} - 1\right)$$

$$\frac{N2}{N1} = \text{Y\_Factor}$$

$$\text{Noise Figure (dB)} = 10 \text{ x Log}\left(\frac{T2 - T1xY}{290x(Y - 1)} + 1\right)$$

$$\text{System Noise Factor} = NF1 + \frac{NF2 - 1}{\text{Gain1}} + \frac{NF3 - 1}{\text{Gain1 x Gain2}} + \ldots\ldots$$

$$\text{Effective Noise Temperature} = 290 \times [NF - 1]$$

Figure 1. Basic noise equations. Note that Noise Factor (NF) is not in dB. K in all equations is Boltzman's constant = 1.38×10^{-23} watt sec/degrees Kelvin. Temperature is in degrees Kelvin.