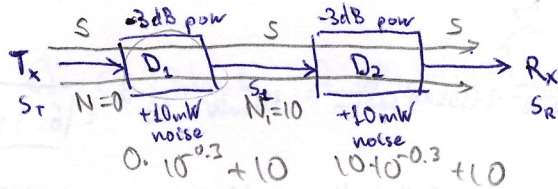## 2.2. NOISY CHANNELS

2.2.1.

A signal is transmitted with 200 mW. It goes through 2 devices, each with 3 dB attenuation and 10 mW. What is the received ~~signal~~ signal to noise ratio?

$$S_T = 200 \text{ mW}$$

$$N_T = 0 \text{ mW}$$

$$S_1 = 200 \text{ mW} \cdot 10^{-\frac{3}{10}} = 100.24 \text{ mW}$$

$$N_1 = 0 + N_{D1} = 10 \text{ mW}$$

$$S_R = S_1 \cdot 10^{-\frac{3}{10}} = 100.24 \text{ mW} \cdot 10^{-\frac{3}{10}} = 50.24 \text{ mW}$$

$$N_R = N_1 \cdot 10^{-\frac{3}{10}} + 10 \text{ mW} = (5.01 + 10) \text{ mW} = 15.01 \text{ mW}$$

$$SNR = 10 \log_{10}\left(\frac{S_R}{N_R}\right) = 10 \log_{10}\left(\frac{50.24 \text{ mW}}{15.01 \text{ mW}}\right) = 10 \log_{10}(3.35) = \boxed{5.25 \quad dB}$$