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Computer Department
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Data Communication
Quiz 2 (Chapter 3)
Time: 10 minutes.
Date: 26/9/2012

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Question 1:

The attenuation of a signal is -10 dB. What is the final signal power if it was originally 5 W?

$$dB = 10\log_{10}(P2/P1)$$
$$-10 = 10\log_{10}(P2/5)$$
$$\log_{10}(P2/5) = -1$$
$$(P2/5) = 10^{-1}$$

P2 = 0.5 W

Question 2:

A line has a signal-to-noise ratio of 1000 and a bandwidth of 4000 KHz. What is the maximum data rate supported by this line?

$$C = B \times \log_2(1+SNR)$$

$$= 4{,}000*10^3 \log_2(1 + 1{,}000) \approx \boxed{40\ Mbps}$$

Question 3:

We have a channel with 4 KHz bandwidth. If we want to send data at 100 Kbps, what is the minimum SNR_{dB}? What is SNR?

$$C = B \times \log_2(1+SNR)$$

$$100*10^3 = 4*10^3 \log_2(1+SNR)$$

$$\log_2(1+SNR) = 25$$

$$1+SNR = 2^{25}$$

$$SNR = 2^{25} - 1 = 33{,}554{,}431$$

$$SNR_{dB} = 10\log_{10}(33{,}554{,}431) \approx 75dB$$