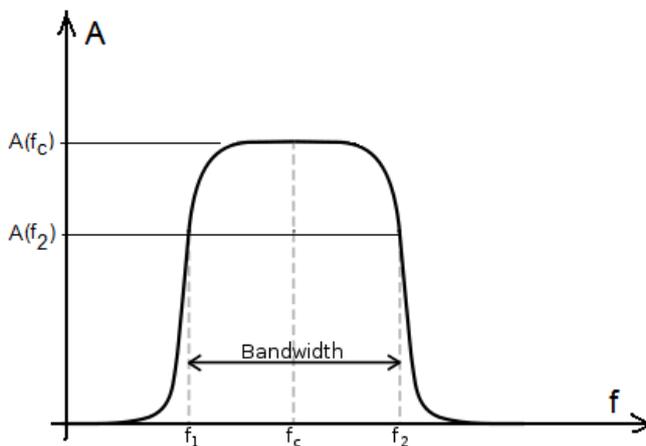


Signal Processing Test 2 example

1. Define the signal-to-quantization-noise ratio - use appropriate equation. Samples of music signals are stored on a CD with a 16-bit resolution. How many quantization levels this resolution gives? What is the signal to quantization noise ratio for such a digitized signal?
2. Write the formula defining the correlation coefficient between signals x and y . What is the range of values the correlation coefficient can assume?
3. A bandpass filter of the following characteristic is given:



Cut off frequencies of the filter (f_1, f_2) are defined as the frequency for which the output of the system drops by 3dB from the nominal passband value. If $A(f_c)=5\text{mV}$, calculate $A(f_2)$. Show calculations.

4. Before sampling an analog signal one should:
 - a) measure its maximum amplitude
 - b) limit maximum frequency of a signal to a predefined value
 - c) measure its minimum and maximum amplitude
 - d) remove DC component of a signal

5. You want to sample an EEG signal with a sampling rate of $f_s=1000$ Hz you should best use the anti-aliasing filter of a cut-off frequency equal to:
- 100Hz
 - 200Hz
 - 250Hz
 - 500Hz
6. What kind of filter would you use to filter out high frequency noise from a signal? Explain in two-three short sentences.
7. Which of the difference equation defines an IIR filter:
- $y(n) = x(n) + y(n-1)$
 - $y(n) = x(n) + 2x(n-1)$
 - $y(n) = x(n) + x(n-10)$
 - $y(n) = x(n) + x(n-2)$
8. Plot a block diagram of a causal filter $y(n) = x(n) - 2x(n-2) + x(n-4)$
9. Why linear phase is an important and desirable property of a filter?
10. What is the Receiver Operating Characteristic (ROC)? Plot an example ROC curve (define the axis properly)