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| **Noms:** |  |
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| **Lloc treball:** |  |
| **Grup:** |  |

1. Listen to the music again and relate the musical events with the content of the STFT (Fig. 3.1). Describe the event that produces the STFT change at approximately 5.5s?
2. In Figure 3.2, identify the strongest frequency components of the music at t=1s. Give their frequencies. Relate these components with the information given in Figure 3.1.
3. Which is the sampling frequency of the decimated signal?
4. Which should the cut-off frequency of the anti-aliasing filter be?
5. Relate the spectral content of this new signal to the original signal spectral composition at t=1s (compare Figure 3.2 and Figure 3.3). Identify those components of the original signal that are preserved in the decimated version and those that are filtered out.
6. The length of the window used to compute the Fourier transform of the decimated signal is the length used with the original signal divided by M. Could you give a reason for this change? Why and how much the magnitude of the Fourier Transform has decreased?
7. Do you perceive a significant difference between both versions of the decimated music? Could you describe this difference?
8. As it can be seen in Figure 3.4, the Fourier transform of the new signal shows two spectral components at t=1s that are not present at the Fourier transform of the pre-filtered decimated signal (Figure 3.3). Give their frequencies.
9. Identify the frequency components of the original signal at t=1s in Figure 3.2 that more likely can produce aliasing when the signal is decimated by M=4 with no antialiasing filter.
10. Give the frequency of the spectral components of the original music that produce the two aliasing components present in Figure 3.4 (Hint: take into account your answer to the question 2 of the previous study).
11. Compare the Fourier transforms in Figure 3.3, Figure 3.6 and Figure 3.7. Point out the main differences between the Fourier transforms in Figure 3.3 and Figure 3.6; repeat this analysis between Figure 3.6 and Figure 3.7. In both cases, explain the causes of the differences you have found out.