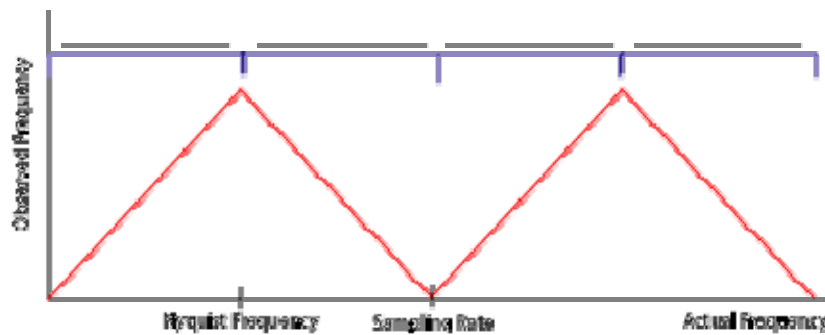


Supplement to Chapter 4 of *The Science of Digital Media* – Digital Audio Representation

Worksheet – Digital Audio > Aliasing¹

Before completing this worksheet, you should view the on-line interactive tutorial "Audio Aliasing." This tutorial can be accessed at the website for *The Science of Digital Media*.

1. What does the Nyquist theorem state about when aliasing will occur, based upon a signal's frequency?
2. What is the *source* of aliasing? Does it have its basis in a sampling rate that is too high? Too low? An insufficient quantization rate? Explain.
3. On the graph below, fill in the blanks to indicate what frequency ranges on the x-axis correspond to Case 1, Case 2, Case 3, and Case 4 of aliasing, as described in the tutorial.



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4. In the blanks below, write the formulas used to calculate the aliased frequency for each of the cases labeled in problem 3.

Case 1:

Case 2:

Case 3:

Case 4:

5. Using the equations that you filled in above, calculate the frequency that would result from sampling the given wave at a sampling rate of 200 Hz. Note that in some cases there may not be any aliasing.

a) a signal of 150 Hz

b) a signal of 50 Hz

c) a signal of 250 Hz

d) a signal of 375 Hz