

# Aliasing

L08

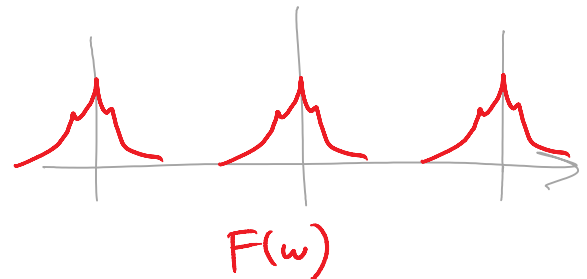
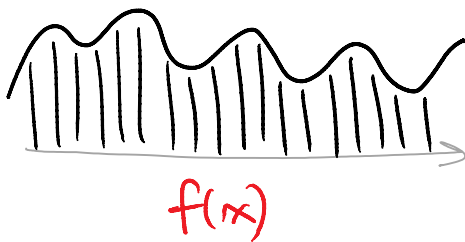
Goal: To observe and understand the issues when sampling an image.

Demo: Moiré video

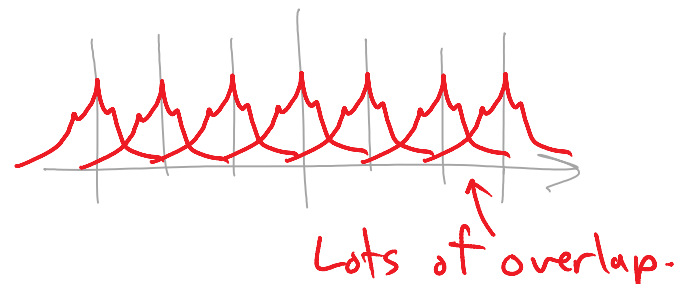
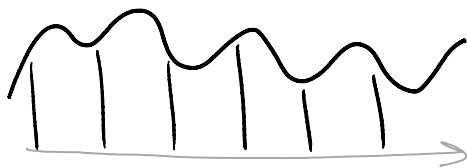
What's going on here?



Suppose we have this signal:



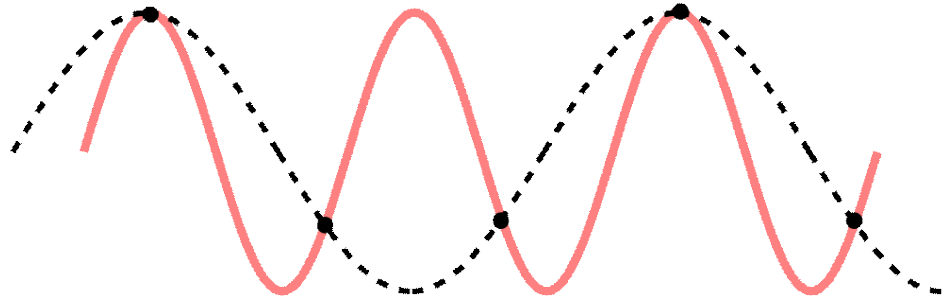
Suppose we sub-sample it by a factor of 3:



The overlap between the copies of the Fourier repetitions is called aliasing. The coeffs. are added & can't be separated to get the correct FT.

## Nyquist-Shannon Sampling Theorem

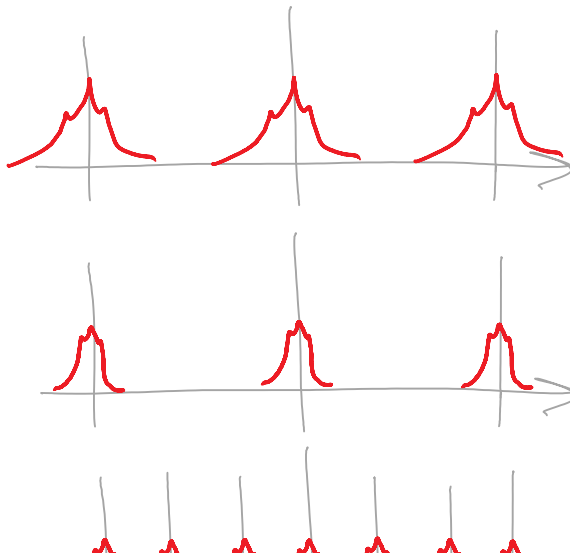
To avoid aliasing, your sampling freq. must be at least double the highest freq. in your signal.



[http://en.wikipedia.org/wiki/Nyquist-Shannon\\_sampling\\_theorem](http://en.wikipedia.org/wiki/Nyquist-Shannon_sampling_theorem)

## Filtering

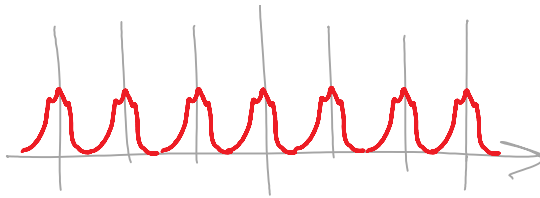
If we want to subsample an image, but avoid Moiré artifacts, we can filter the image first. Filtering is multiplying the Fourier coeffs. to adjust the relative contributions of the different frequencies. In our case, we need to dampen the higher frequencies so they don't overlap so much.



Original FT

Filtered to dampen  
higher frequencies

FT of subsampled



FT of subsampled  
image ... not much  
overlap.

Demo: Moiré script.

Strobe Effect

(a related phenomenon)



<http://youtu.be/ltMPMz37VPk>