

1. What is the defining property of Gaussian noise?

The defining property is that its pdf (i.e. the probability distribution/density function) takes the form of a “bell shaped curve known as a Gaussian” [1]. This means that **the values a Gaussian noise can take on are all gaussian-distributed** if we would be able to obtain an infinite number of samples.

2. What does a low-pass filter do in general?

Low-pass filters define a so-called cutoff frequency and let all frequencies below this cutoff pass while blocking frequencies above it [1]. This means, a low-pass filter removes high frequencies (above the cutoff) in a signal and therefore, smooths the original signal as the range of possible values after applying the filter is smaller than before. For this reason, they are very good at removing noise in signals.

3. Is a moving average filter a low-pass or a high-pass filter? Why?

The moving average filter is a **low-pass filter** as he is “is optimal for a common task: reducing random noise” [1]. Moving over the signal's values and **calculating the average** values is a simple form of a convolution and does exactly the same thing that low-pass filters are designed to: it **smooths the original signal by removing any high frequencies and thereby removes random noise**.

Sources:

[1] Smith, S. W. (1997). *The scientist and engineer's guide to digital signal processing* (Vol. 14, p. 626). San Diego: California Technical Pub. (Online Version accessed June 12, 2021 at <http://www.dspguide.com/>)