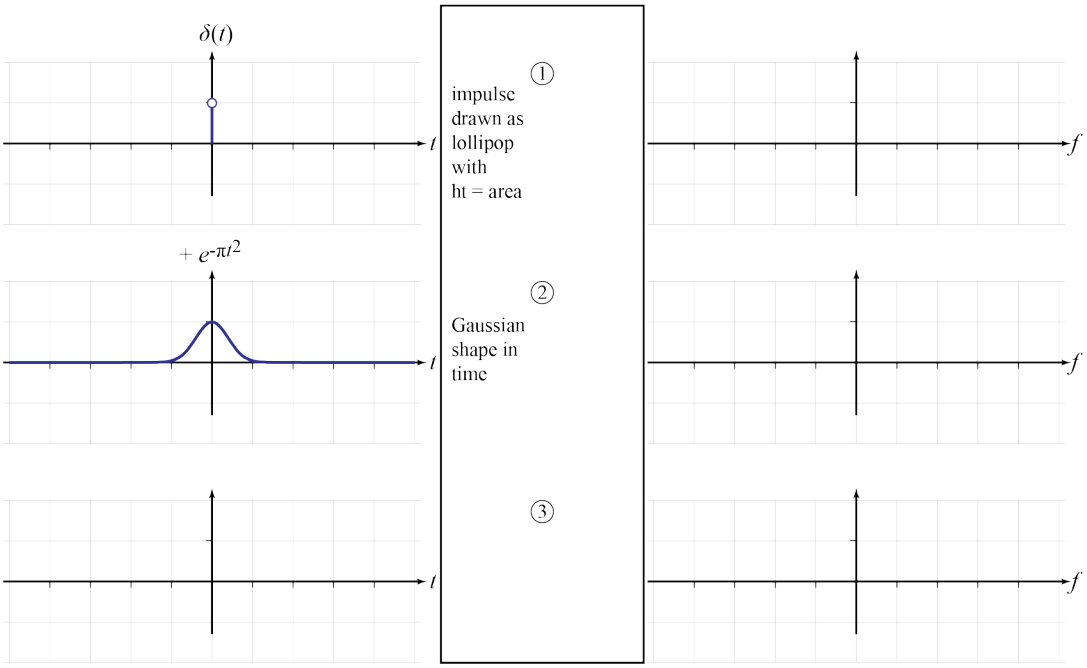
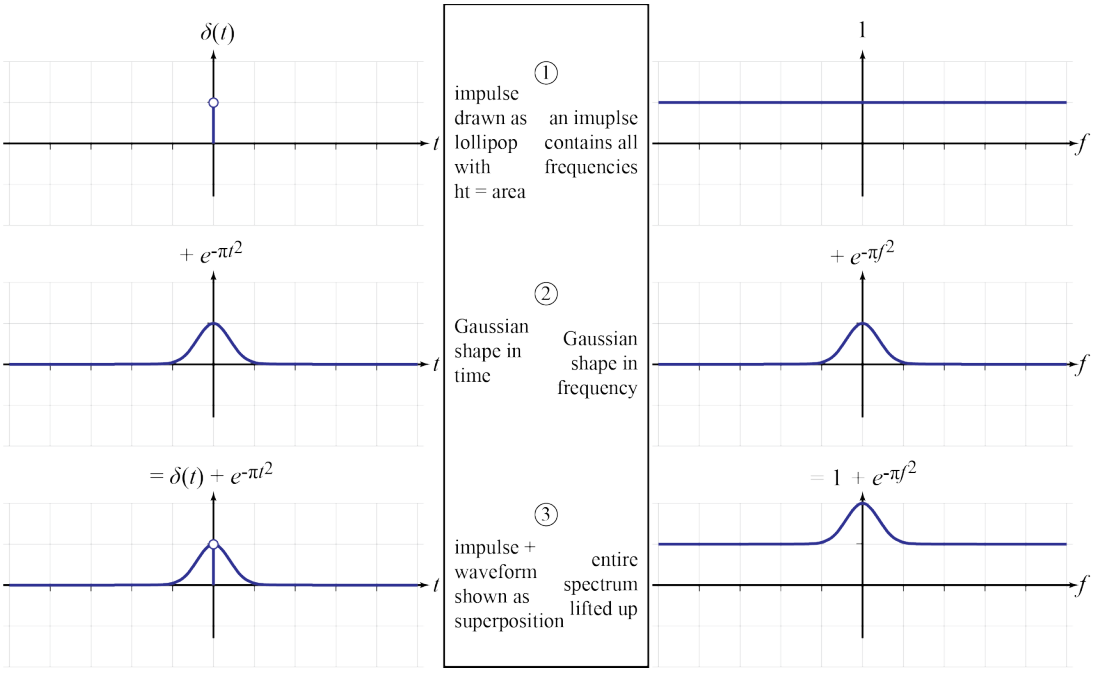
**EX:** Complete the Rosetta Stone diagram, below, to see the spectrum of an impulse plus a "gaussian" function (not capitalized to honor gauss as the greatest of all mathematicians), which is the bell curve of probability. It turns out that, if we convolve a function with itself, over and over, we get the gaussian function. Another remarkable feature of the gaussian function is that the Fourier transform of the gaussian is a gaussian.



**SOLN:** The impulse and the gaussian are in the table of Fourier transform pairs. The impulse has equal amounts of all frequencies (and infinite energy). Thus, it lifts up the spectrum at all frequencies.

The gaussian transforms to a gaussian, as noted above. Thus, our final spectrum is as shown on the lower right. In practice, this signal would sound like random (or white) noise but with a bit more low frequency than pure noise.

As the diagram notes, when summing an impulse with another function, we show the impulse and the function superimposed. In reality, the impulse is infinitely tall but zero width (with an area of one).




**REF:** Ronald Bracewell, *The Fourier Transform and its Applications*, 2nd Ed., New York, NY: McGraw-Hill, 1978. ISBN 0-07-007013-X