Ex: The output of a Linear, Time-Invariant (LTI) system is the convolution of the input signal with the impulse response of the LTI system. Sketch the convolution, $y(t) = x(t) * h(t)$ for the three scenarios shown below. Use the concept that convolution of a function with an impulse creates a copy of the function scaled by the area of the impulse and shifted sideways by the location of the impulse relative to the origin.

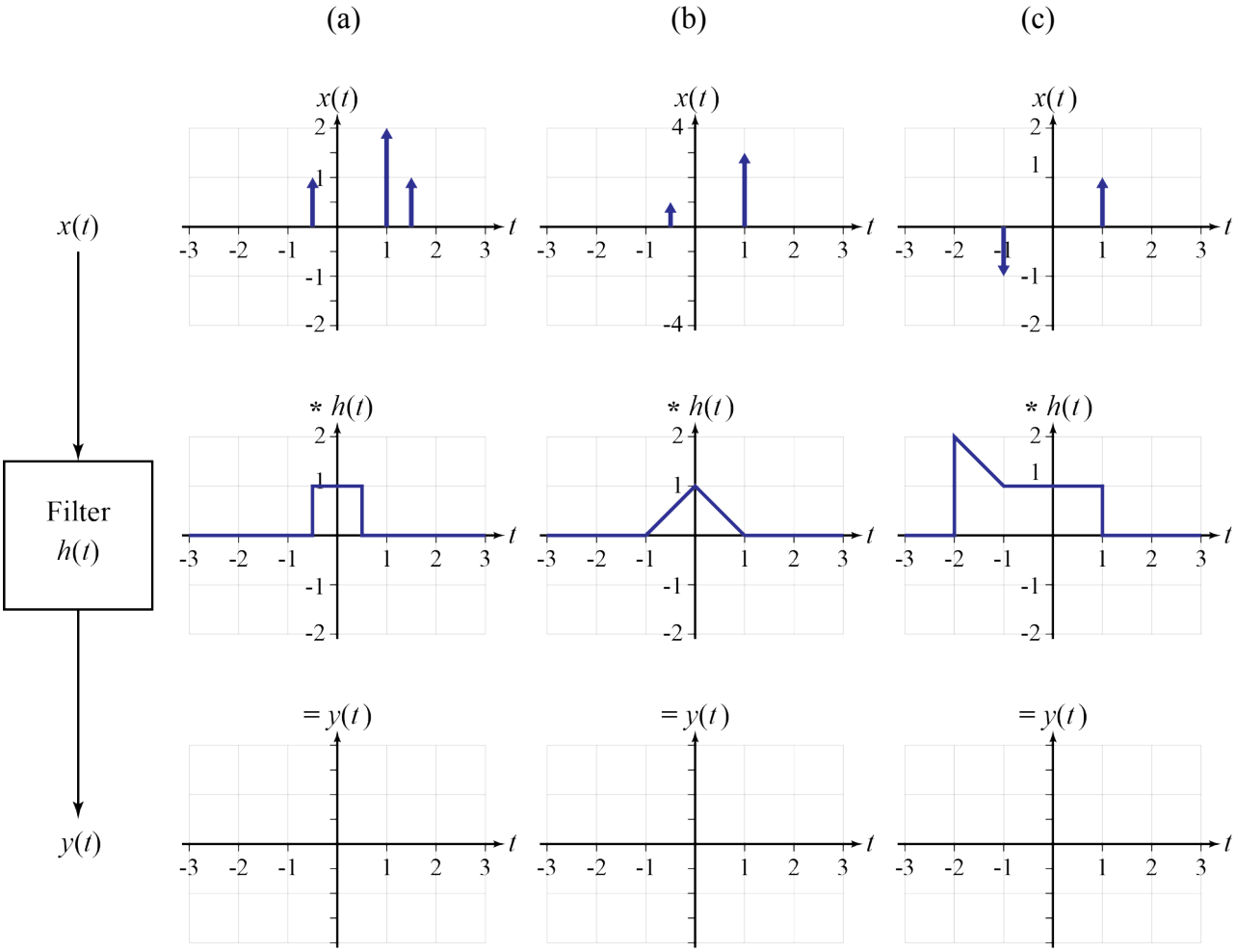

Fig. 1. Three convolution problems.

SOLN: See Fig. 2 below. An impulse convolved with a function results in replication of the function, scaled by the impulse's area and shifted right or left the amount by which the impulse is shifted right or left from the origin.

In Fig. 2, the replicated functions are shown in the third line, and the sum of the replicated functions is shown separately in the added fourth line.

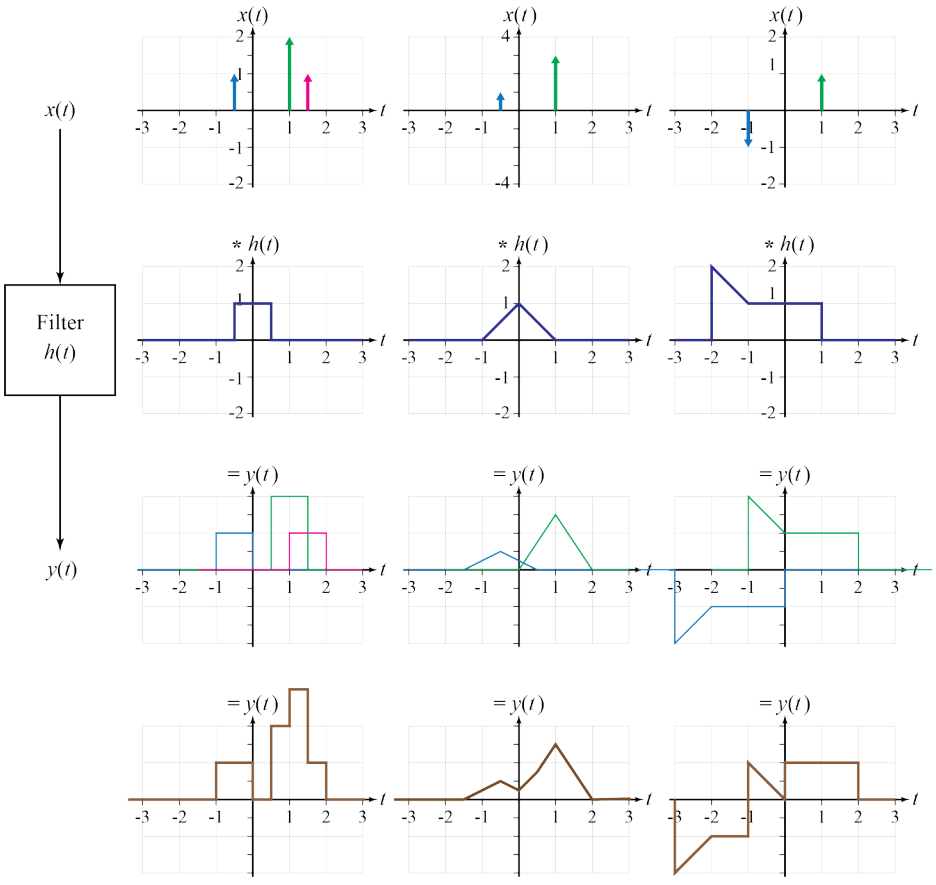

Fig. 2. Solutions for three convolution problems.