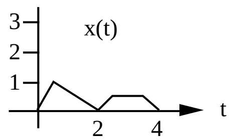
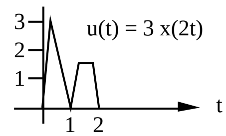
Combinations of the above operations: In the future we will frequently encounter signals obtained by combining several of the operations introduced above, for example,

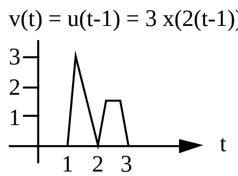
$$y(t) = 3\ x(-2(t-1))\ .$$

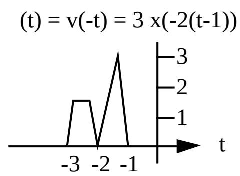
To figure out what signal this is, it is useful to introduce some intermediate signals. For example, in the above, we might start by plotting x(t) and u(t) = 3 x(2t), as shown next.





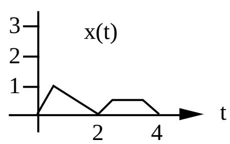
which is an amplitude scaling and time scaling of x(t). Next, one might plot v(t) = u(t-1) = 3 x(2(t-1)), which is a time shifting of u(t) by one time unit. Finally, we plot y(t) = v(-t) = 3 x(-2(t-1)) . **This is a mistake: replacing t by -t in v(t) actually gives v(-t) = 3x(2((-t)-1)) = 3x(-2t-2), which is not the desired signal y(t) = 3 x(-2(t-1)).**

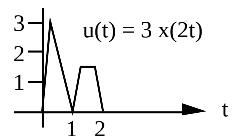




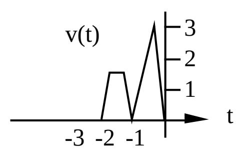
Note that you can also find y(t) by applying the scaling, time shifting and time reversal in some other order, or by applying several at a time. But until you are very experienced, it is advisable to apply only one or two at a time.

Corrected Version: Let us start by plotting x(t) and u(t) = 3 x(2t), as shown next.





Next let's plot v(t) = u(-t) = 3 x(2(-t)) = 3 x(-2t).



Finally, we plot v(t-1) = 3 x(-2(t-1)) = y(t)