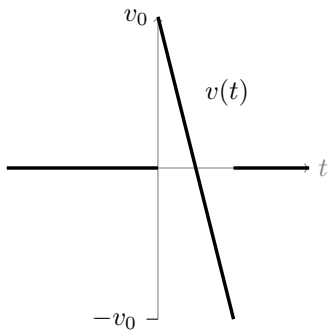
Generalized Derivatives.

Quiz: When you fire a gun, you exert a very large force on the bullet over a very short period of time. If we integrate $F = ma = mx''$ we see that a large force over a short time creates a sudden change in the momentum, mx'. This is called an "impulse."

If the gun is fired straight up, the graph of the elevation of the bullet, plotted against t, starts at zero, then rises in an inverted parabola, and then when it hits the ground it stops again.

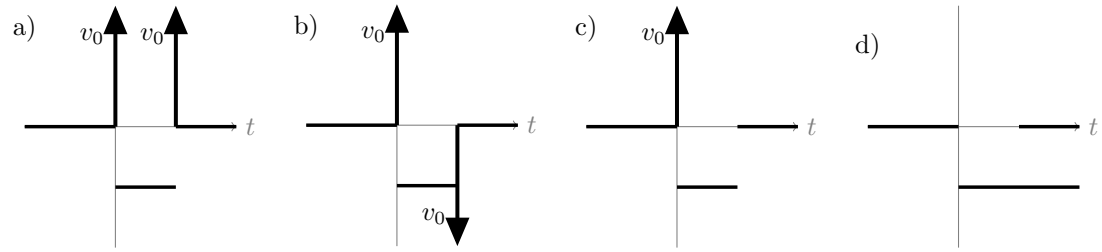
The velocity (derivative of the position function) is zero for $t < 0$; then it rises to v_0 (the initial velocity of the bullet); then it falls at constant rate (the acceleration of gravity) until the instant when it hits the ground, when it returns abruptly to zero.

The graph of $v(t)$ looks like this:



What does the graph of the generalized derivative of $v(t)$ look like?

Choices:



e) None of these.

Answer: (a).

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18.03SC Differential Equations
Fall 2011

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