Part II Problems

Problem 1: [Step and delta] For each of the following functions $f(t)$, (i) draw a graph, (ii) draw a graph of the generalized derivative, (iii) write a formula for $f(t)$ and for $f'(t)$ (with possibly a few values not defined) using $u(t-a)$, $\delta(t-a)$, and other functions.

(a) $f(t) = 0$ for $t < 0$, $f(t) = -t$ for $t > 0$.

(b) $f(t) = 0$ for $t < 0$, $f(t) = 1 - t$ for $t > 0$.

(c) $f(t) = 0$ for $t < 0$, $f(t) = 2t - 1$ for $0 < t < 1$, $f(t) = 0$ for $t > 1$.

(d) $f(t) = 0$ for $t < 0$, $f(t) = t - \lfloor t \rfloor$ for $t > 0$, where $\lfloor t \rfloor$ denotes the greatest integer less than or equal to t.

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