

### Unit Impulse Response: Post-initial Conditions

**Quiz:** Let  $w(t)$  be the solution to  $m\ddot{x} + kx = \delta(t)$  with rest initial conditions. What is  $\dot{w}(0^+)$ ?

**Choices:**

- a)  $\dot{w}(0^+) = 0$
- b)  $\dot{w}(0^+) = \omega_m$
- c)  $\dot{w}(0^+) = k$
- d)  $\dot{w}(0^+) = k/m$
- e)  $\dot{w}(0^+) = 1/m$
- f) None of these.

**Answer:** (e).

The unit impulse input causes a unit jump in momentum. Starting from rest this means  $m\dot{w}(0^+) = 1$  or  $\dot{w}(0^+) = 1/m$ .

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