The Theoretical Minimum

Classical Mechanics - Solutions

L03E03

Last version: tales.mbivert.com/on-the-theoretical-minimum-solutions/ or github.com/mbivert/ttm

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Exercise 1. *Show by differentiation that this satisfies the equation of motion.*

Contrary to the previous exercise, instead of integrating to find the solution, we start from the solution and climb back to our original equation of motion, which are, in the case of a constant force F_z applied to a mass m following the z-axis:

$$v_z(t) = \dot{z}(t) = v_z(0) - \frac{F_z}{m}t$$

The proposed solution is:

$$z(t) = z_0 + v_z(0)t + \frac{F_z}{2m}t^2$$

Immediately, by derivation, constants goes to 0, t becomes 1 and t^2 becomes $2t$, we indeed obtain:

$$\boxed{\frac{d}{dt}z(t) = \dot{z}(t) = v_z(t) = v_z(0) + \frac{F_z}{m}t} \quad \square$$