

PHYS 105: Computational Physics I

Spring 2015

In-class exercise #3.3

A particle starts at position $x = 0$ and moves in one dimension on a trajectory with velocity

$$v(t) = J_0(t),$$

where the function $J_0(s)$ is as described in the previous exercise.

(a) Use the trapezoid rule to compute the position of the particle

$$x(t) = \int_0^t v(s) ds$$

on a grid of points with $t_i = i\delta t$, $\delta t = 0.1$, and $0 \leq t_i \leq 30$. Plot $x(t)$ and $v(t)$ on a single graph.

(b) Use numerical differentiation to compute and plot the particle's acceleration

$$a(t) = \frac{dv}{dt}.$$