PHYS 105: Computational Physics I

Spring 2015

In-class exercise #3.1

A particle moves in one dimension on a non-periodic oscillatory trajectory described by

$$x(t) = J_0(t^2),$$

where the function $J_0(s)$ (a Bessel function) is available in C++ via

```
#include <cmath>
y = j0(s);
```

and in Python with

```
from scipy.special import jn
y = jn(0, s)
```

(a) Plot the trajectory of the particle for $0 \leq t_i \leq 10$, with $t_i = i\delta t$ and $\delta t = 0.05$.

(b) Using the above value of δt, determine the first *three* times the particle crosses $x = 0$ from below. Use linear interpolation to refine your answer.