

## Math 330 HW 2

In this homework assignment, you are asked to do some numerical explorations on the Van Der Pol equation

$$x'' + \mu(x^2 - 1)x' + x = 0.$$

1. Numerically determine the period  $T$  of the limit cycle for  $\mu = 0 : 0.05 : 0.5$ , and  $\mu = 5 : 5 : 50$ , i.e.,  $\mu = 0, 0.05, 0.1, \dots, 0.45, 0.5$  and  $\mu = 5, 10, 15, \dots, 45, 50$ .
2. Can you do data fitting and come up with formulas for  $T$  versus  $\mu$  when  $\mu \ll 1$  and  $\mu \gg 1$ ?

Note: You can use either

$$\begin{cases} x' = y \\ y' = -x - \mu(x^2 - 1)y \end{cases}$$

or

$$\begin{cases} x' = \mu\{y - (\frac{1}{3}x^3 - x)\} \\ y' = -\frac{1}{\mu}x \end{cases}$$

in your numerics.