Math002A Assignment 5.2&3 Last Name___________________ 1st____________

DIRECTIONS To receive full credit, you must provide complete legible solutions to the following problems in the space provided

1. Solve equation $EI\frac{d^4y}{dx^4} = w(x)$ subject to the appropriate boundary conditions. The beam is of length L, and w_0 is a constant.

a. The beam is embedded at its left end and simply supported at its right end, and $w(x) = w_0$, $0 < x < L$.

b. Use a graphing utility to graph the deflection curve when $w_0 = 48EI$ and $L = 1$.

2. Find the eigenvalues λn and eigenfunctions yn(x) for the given boundary-value problem. (Give your answers in terms of n, making sure that each value of n corresponds to a unique eigenvalue.) $y'' + \lambda y = 0,\ y'(0) = 0,\ y'(\pi) = 0$

3. The given differential equation is a model of an undamped spring/mass system in which the restoring force F(x) in (1)

$$m\frac{d^2x}{dt^2}+F(x) = 0, \qquad (1)$$

is nonlinear. For the equation below use a numerical solver to plot the solution curves that satisfy the given initial conditions.

$$\frac{d^2x}{dt^2}+x^3=0,\ x(0)=1,\ x'(0)=1;\ x(0)=\frac{3}{4},\ x'(0)=-1$$