**MATH 238** **Test2**

**Instructions: Write your name on the answer sheet provided. Show all of your work and write your answers on the answer sheet.**

**1)[15pts]** A mass weighing 3 lb stretches a spring 3in. If the mass is pushed upward, contracting the spring a distance of 1in., and then set in motion with a downward velocity of 2ft/sec, and if there is no air resistance, find the position u of the mass at any time t. Determine also the frequency, and amplitude of the motion.

**2) [15pts]** A mass weighing 4 lb streches a spring 1.5 in. The mass is displaced 2 in. downward from its equilibrium position and released with no initial velocity. Assuming that there is no damping, and that the mass is acted upon by an external force of $2t$ lb, determine the position of the mass at any time.

**3) [15pts]** Find the solution of the initial value problem

$$16y'' - 8y' + 145y = 0, \qquad y(0) = -2, \quad y'(0) = 1\,.$$

**4)[10pts]** Use Euler's method with step size $\Delta t = 0.5$ to approximate the solution of

$$y' = \frac{1+x}{1+y^2}, \quad y(0) = 1$$

at $t = 1$.