

Math 34 Differential Equations Exam #1
March 4, 2005

SHOW ALL WORK

[27] 1.) A mass weighing 1 kg stretches a spring 9.8m. If the mass is pulled down an additional 2m and then set in motion with an upward velocity of 2m/sec, and if there is no damping, determine the position u of the mass at any time t . Find the frequency, period, and amplitude of the motion.

Answer

position: _____

frequency = _____ period = _____ amplitude = _____

[18] 2.) Find the general solution to the following differential equation:

$$4y' = t(y^2 - 4)$$

Answer 2.) _____

[18] 3.) Find the general solution to the following differential equation:

$$ty' + 3y = t^5$$

Answer 3.) _____

[15] 4.) Draw a direction field for the following differential equation:

$$y' = (y + 3)(y - 2)$$

Find the equilibrium solution(s) and determine if asymptotically stable, semistable, or unstable.

[9] 5.) Suppose that the general solution to $y'' - y = 0$ is $c_1e^t + c_2e^{-t}$. Find the general solution to $y'' - y = \cos(t)$

Answer 5.) _____

[6] 6.) Calculate the Wronskian of $f(x) = e^x$ and $g(x) = e^{x-1}$. Are f and g linearly dependent or linearly independent?

7.) Match the following differential equation to its graph:

[3] 7i.) $y'' + 2y' + y = 0$, $y(0) = 0.1$, $y'(0) = 0.2$

[3] 7ii.) $y'' + 2y' + 10y = 0$, $y(0) = 0.1$, $y'(0) = 0.2$

[3] 7iii.) $y'' + 10y = 0$, $y(0) = 0.1$, $y'(0) = 0.2$