

Instructions: Show all work. Give exact answers (yes, that means fractions, square roots and exponentials, and not decimals) unless specifically directed to give a decimal answer. This will require some operations to be done by hand even if not specifically directed to. Be sure to complete all parts of each question.

1. Verify the solution to ordinary differential equation $y'' - y = 0$, $y_1(t) = e^t$, $y_2(t) = \cosh(t)$.

$$y_1 = e^t$$

$$y_1' = e^t$$

$$y_1'' = e^t$$

$$e^t - e^t = 0 \quad \checkmark$$

$$y_2 = \cosh t$$

$$y_2' = \sinh t$$

$$y_2'' = \cosh t$$

$$\cosh t - \cosh t = 0 \quad \checkmark$$

they are both solutions

2. Determine whether the equation $y''' + ty' + (\cos^2 t)y = t^3$ is a) linear or nonlinear, b) ordinary or partial, c) and the order of the equation.

a) linear

b) ordinary

c) 3rd order