

DIFFERENTIAL EQUATIONS HOMEWORK 1

2008 FALL

- (1) **1.3.4.** Determine the order of the differential equation; also state whether the equation is linear or nonlinear:

$$\frac{dy}{dt} + ty^2 = 0.$$

- (2) **1.4.12.** Verify that each given function is a solution to the differential equation:

$$t^2 y'' + 5ty' + 4y, \quad t > 0; \quad y_1(t) = t^{-2}, \quad y_2(t) = t^{-2} \ln t.$$

- (3) **1.3.18.** Determine the values of r for which the given differential equation has solutions of the form $y = e^{rt}$.

$$y''' - 3y'' + 2y' = 0.$$

- (4) **1.3.20.** Determine the values of r for which the given differential equation has solutions of the form $y = t^r$ for $t > 0$.

$$t^2 y'' - 4ty' + 4y = 0.$$

- (5) **1.3.27.** Verify that each given function is a solution to the given partial differential equation:

$$a^2 u_{xx} = u_{tt}; \quad u_1(x, t) = \sin(\lambda x) \sin(\lambda at), \quad u_2(x, t) = \sin(x - at),$$

where λ is a real constant.