

## HOMEWORK 2

1. Find the general solutions to the following ODEs

$$y' + 3y = t + e^{-2t}$$

$$(1 + t^2)y' + 4ty = (1 + t^2)^{-2}$$

and determine the long term behaviors of the solution.

2. Find the solutions to the following IVPs and

$$t^2y' + 2ty = \cos t, y(\pi) = 0, t > 0$$

$$ty' + 3y = \cos t, y(\pi) = 0, t > 0$$

and determine the long term behaviors of the solution.

3. (Bonus) For the ODE

$$ty' + (t - 1)y = -e^{-t}$$

Investigate the following sets of initial values

$$y(0) = 0 \text{ and } y(0) = 1$$

What happens in each case?