

Each group only needs to submit ONE file containing your solutions!

Problem 1. Consider the damped harmonic oscillator

$$y'' = -ay - by'$$

where a, b are positive constants. (Some physics background: here $y(t)$ is the displacement of a mass point, hanging on a spring. $-ay$ is the force from the spring, by Hooke's law. by' is a friction term (say, air frictions), assumed to be proportional to the velocity.) Find the general solution, and express it using real-valued functions. (you may need to separate into the cases when the roots of $p(z)$ is multiple, distinct real or distinct complex.)

Problem 2. Consider the ODE

$$y''' - 3y'' + 3y' - 1 = 0$$

- (1) Find a fundamental set of solutions.
- (2) Check that this set is indeed a fundamental set, by showing that its Wronskian is nonzero.