You must show all your work to receive credit. Calculators are allowed.

Problem 1: (3 points) Find the general solution to

$$y'' + 8y' + 25y = 0.$$

Solution:
The characteristic equation is
$$k^2 + 8k + 25 = 0.$$

The quadratic formula gives the solutions

$$k = \frac{-8 \pm \sqrt{8^2 - 4 \cdot 25}}{2} = -4 \pm 3i.$$

These are complex conjugate roots, so the general solution is

$$y = e^{-4x}(C_1 \cos 3x + C_2 \sin 3x).$$