

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Show that the functions $\sin t$, $\sin 2t$ and $\sin 3t$ are linearly independent functions over \mathbb{R} .

2. Find the general solution of the third-order nonhomogeneous linear differential equation

$$y''' - 3y'' - 9y' + 27y = 2e^{3t}.$$

3. (a) Find the six complex sixth roots of $z = -1$.

(b) Find the general solution of the differential equation

$$y^{(6)} + y = 0$$

and express it in terms of real value functions only.