

1. (5 points) Find the general explicit real solution for $\frac{d^4y}{dx^4} + 5\frac{d^2y}{dx^2} - 36y = 0$.

2. (5 points) Solve $y'' + 10y' + 25y = 0$, $y(0) = 2$ and $y'(0) = -1$.

3. (5 points) Find the value of m that makes $(mxy^3 + 4)dx + (3x^2y^2 - 5)dy = 0$ into an exact equation and then find a general **implicit** solution.

4. (6 points) Use a substitution to solve the IVP $y' - yx^{-1} = y^3x^{-3}$, $y(1) = 1$.
5. (4 points) Draw the phase line diagram for $y' = (3 - y)(y + 2)(y^2 - 1)$ and determine the stability of each critical point.