

MAT 2384 3X Assignment # 3
due Wednesday, June 15th

Solve the following initial value problems:

1. $x^2y'' + 7xy' + 9y = 0, \quad x > 0, \quad y(1) = 1, \quad y'(1) = 0$
2. $x^2y'' - 3xy' + 8y = 0, \quad x > 0, \quad y(1) = 2, \quad y'(1) = 4$
3. $y''' + 6y'' + 12y' + 8y = 0, \quad y(0) = 1, \quad y'(0) = -3, \quad y''(0) = 10$
4. $y^{(4)} + 5y'' + 4y = 0, \quad y(0) = 1, \quad y'(0) = -6, \quad y''(0) = -1, \quad y'''(0) = 24$
5. $x^3y''' - x^2y'' + 2xy' - 2y = 0, \quad x > 0, \quad y(1) = -3, \quad y'(1) = -7, \quad y''(1) = -9$

6. Consider the data points $((x_j, f_j), \text{ where } f_j = f(x_j))$: $(1.3, 2.4)$, $(1.8, 3.2)$ and $(2.1, 4.3)$. Find $p_2(x)$ (with coefficients to 4 decimal places) via Lagrangian Interpolation. Interpolate a value at $x = 1.5$. Given that $0.75 \leq f'''(x) \leq 2.5$ on $[0, 3]$, estimate the error bounds.