

MATH 246 Homework 2.2
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Directions:

- Work should be done neatly and on separate paper.
 - Enough work must be shown so that the steps you are taking is clear.
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1. Check that each pair given form a fundamental pair of solutions to the differential equation. Note that you must check both that they're solutions and that they form a fundamental pair!
 - (a) DE: $t^2y'' - 2y = 0$
Pair: $Y_1(t) = t^2$ and $Y_2(t) = \frac{1}{t}$
 - (b) DE: $y'' - 4y' + 4y = 0$
Pair: $Y_1(t) = e^{2t}$ and $Y_2(t) = te^{2t}$
 - (c) DE: $t^2y'' + ty' - 4y = 0$
Pair: $Y_1(t) = t^2$ and $Y_2(t) = t^{-2}$
 - (d) DE: $t^3D^3y - 6t^2D^2y + 15tDy - 15y = 0$
Pair: t, t^3, t^5
2. Solve the following initial value problems and give the interval of existence for each solution. Hint: Use the fundamental pairs from the previous questions!
 - (a) $t^2y'' - 2y = 0$ with $y(1) = -1$ and $y'(1) = -2$.
 - (b) $y'' - 4y' + 4y = 0$ with $y(0) = 3$ and $y'(0) = -2$.
 - (c) $t^2y'' + ty' - 4y = 0$ with $y(-1) = 1$ and $y'(-1) = 6$.
 - (d) $t^3D^3y - 6t^2D^2y + 15tDy - 15y = 0$ with $y(2) = 0$ and $y'(2) = 2$ and $y''(2) = -1$.
3. Prove that if Y_1 and Y_2 form a fundamental pair of solutions then so do $Y_1 + Y_2$ and $Y_1 - Y_2$.