SERIE SOLUTION NEAR X=0 $P_{0}(x)y'' + P_{1}(x)y' + P_{2}(x)y = 0$ you can't write $y(x) = \sum_{n=0}^{\infty} A_n(x-\infty)^n$ x->0 t->0 let t= + □ ,[∠]

X > 00 t > 0 let t= + $\frac{d(1)}{dx} = \frac{d(1)}{dt} \frac{dt}{dx} = \frac{d(1)}{dt} \begin{bmatrix} -1 \\ x^{-2} \end{bmatrix}$ $= -\frac{1}{\chi^2} \frac{d}{dt} = -t^2 \frac{d}{dt}$ $\frac{d^{2}()}{dx^{2}} = \frac{d}{dx} \frac{d}{dx} = -t^{2} \frac{d}{dt} \begin{bmatrix} -t^{2} \frac{d}{dt} \end{bmatrix}$

So if we apply this idea to an equation like $x^2y''+xy'+y=0$ in the vicinity of $x=\infty$

(x-0) Ex: $P_0(x) = x^2 \implies \frac{1}{t^2}$ $x^{2}y'' + xy' + y = 0$ + 2 22 dy + t dy + - - t dy + y -1x-2 ty"+ty +y=0 $d = -t^2 d$ $-t^{2}\frac{d}{dt}\left[-t^{2}\frac{d}{dt}\right] = -t^{2}\left[-2t\frac{d}{dt}-t^{2}\frac{d^{2}}{dt^{2}}\right]$ 1. Find the solution to y"= xy about x=1 2. If X & X are solutions to a 2nd order ODE "determine the gover diff. equation . I what is the classification of the equation seen x=0 3) what about at x=00. What is the radius of conseignce How do you classify 5 . 2(x-2) x y" + 3xy' + (x-2)y=0 about x=2, x=0, x=5, x=00 Find the series solution to (1-x2) y" - 2xy +x(x+1) y = 0

Po(x)=1, P1(x)=0 and P2(x)=-x for problem 1.

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