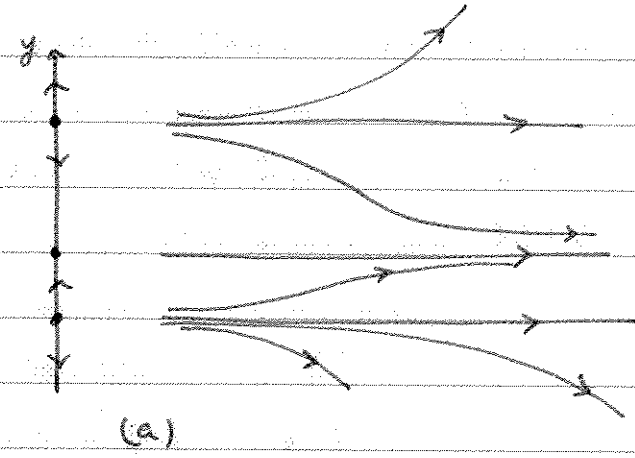
Solutions Final Math 2150 F'06

1. Standard form: $y'' + \frac{1}{(t+1)(t-3)} y = 0$, $y(0) = 1$

5 

Solution exists on $(-\varepsilon, \varepsilon)$ (Non-linear)

2. 

(a)

(b) If $y(0)$ is in $(1,4)$ then $y \to 2$ as $t \to \infty$

5 3. (a) 2nd order, dim = 2

5 (b) 2nd order, 2 initial conditions, dim = 0. (1 sol.)

4. $L[c_1y_1 + c_2y_2 + c_3y_3 + c_4y_4] = 0 + 0 + c_3e^{3t} + c_4e^{-4t}$

5 So $y = c_1y_1 + c_2y_2 + 2y_3 - 3y_4$

5. $y_1 = y$ $\quad y_1' = y_2$

10 $y_2 = y'$ $\quad y_2' = y_3$

$y_3 = y''$ $\quad y_3' = y'' = 5y' - 4y$

$= -4y_1 + 5y_2$

$$y(0) = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$