Work steet:

2nd order brear ODEs - const. coeffs. homogeneous case
10/3/05

a) Consider
$$y'' - y = 0$$

Find a fune whose 2nd deriv. is itself: y1(t) =

Find another (different!) one [Hint: what if y at -y they?]

ye(t) =

b) Using your y, & gz, evaluate d2 [5y, (+) - 3y2(+)]

So does 5y, (+) - 3y2(+) satisfy y"-y=0?

Does c, y, (t) + czyz(t) satisfy it for all c, , cz?

Choose $(1, c_2)$ to match this initial condition: $\begin{cases} y(0) = 3 \\ y'(0) = 4 \end{cases}$

Could you match any IC yo, yo ?

Why? [Hirt: find general formula for e, cz]

2nd order know OFE 5 - const. coeffs. homogeneous case a) Consider y'' - y = 0Find a func. whose 2nd deriv. is itself: y1(4 = et Find another (different!) one [Hint: what it $y = \frac{4t}{3} - y = \frac{4t}{3}$, $y = \frac{4t}{3}$.

The cost -1 - 5mt $y = \frac{4t}{3} - \frac{4t}{3} = \frac{4t}{3} - \frac{4t}{3} = \frac{4t}{3}$. note: sint -1 cost - - sint wrong sign! b) Using your y, & g2, evaluate $\frac{d^2}{dt^2} [5y_1(t) - 3y_2(t)]$ So does 5y, (+) - 3yz(+) satisfy y"-y=0? $\frac{d^{2}}{dt^{2}}(5e^{t}-3e^{-t}) = \frac{d}{dt}(5e^{t}+3e^{-t}) = (5e^{t}-3e^{-t})$, ie itself-=) yes, ODE is satisfied! Does (1y1(t) + czyz(t) satisfy it for all c, , cz?

Yes since 5, -3 were orbitrary

this initial condition: Choose (1, (2 to match this initial condition: $\begin{cases} y(0) = 3 \\ y'(0) = 4 \end{cases} \qquad y(0) = c_1 e^0 + c_2 e^{-0} = c_1 + c_1 = 3.$ $y' = c_1 e^t - c_2 e^{-t} - c_3 e^{-t} = c_1 - c_2 = 4.$ due to Ste(e-t).

Lesolve 2 simultaneons

any IC 40, 46?

C1 = 7/2 equs. Could you month any IC yo, yo ? C2 = - 1/2 Why? [Hint: find general formula for e,, cz]

WORK SHEET: