Quiz 7a **Calculus 2** **4/19/04**

Each problem is worth 5 points. For full credit provide proper justification for your answer.

1. Find a **general** solution to the differential equation $y'' + 4y' - 5y = 0$.

$y = e^{st}$
$y' = s \cdot e^{st}$
$y'' = s^2 \cdot e^{st}$

$(s^2 \cdot e^{st}) + 4(s \cdot e^{st}) - 5(e^{st}) = 0$

$e^{st}(s^2 + 4s - 5) = 0$

$(s+5)(s-1) = 0$

Excellent!

solution could be $y = e^{-5t}$ + $y = e^{t}$

general solution is $y = a \cdot e^{-5t} + b e^{t}$

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2. If you know that the differential equation $y'' + 3y' + 2y = 0$ has the general solution $y = ae^{-t} + be^{-2t}$, find a **particular** solution that satisfies the conditions $y(0) = 1$ and $y'(0) = 1$.

$ae^{-t} + be^{-2t}$

put 0 in for t and that makes e = 1 so you have a+b = 1
then put it into the derivative equation & the zero turns the e's into 1 again.
you solve for a or b for the 1st equation you got & put it into the 2nd.
You can solve from there

$ae^{-(0)} + be^{-2(0)} = 1$

$a + b = 1$

$y' = -ae^{-t} + -2be^{-2t} = 1$

$-ae^{0} + -2be^{2(0)} = 1$

$= -a - 2b = 1$

Excellent

$a = 1 - b$

$-(1-b) - 2b = 1$

$-1 + b - 2b = 1$

$-b = 2$

$\boxed{b = -2}$

$a - 2 = 1$

$\boxed{a = 3}$

$\boxed{3e^{-t} - 2e^{-2t}}$