Quiz 7b **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 $y'' + y' - 6y = 0$.

assume $y = e^{s \cdot t}$

$y' = se^{st}$

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

$s^2 e^{st} + se^{st} - 6(e^{st}) = 0$

$e^{st}(s^2 + s - 6) = 0$

$e^{st}(s+3)(s-2) = 0$

$s = -3$ $s = 2$ so $y = ae^{-3t} + be^{2t}$

Excellent

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 $y(0) = 0$ and $y'(0) = 1$.

We have,

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

But, $y(0) = 0$

So, $0 = ae^{-0} + be^{-2 \cdot 0}$

or, $a + b = 0$ or, $a = -b$

Nice Job!

Now,

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

Also, $y'(0) = 1$

So, $1 = -a \cdot e^{-0} - 2b \cdot e^{-2 \cdot 0}$

or, $1 = -a - 2b$

But, $a = -b$

So, $1 = b - 2b$

or, $1 = -b$

$\therefore b = -1$

$a = 1$

$\boxed{y = e^{-t} - e^{-2t}}$