$y = 3\cos\frac{1}{2}t$

$y' = -\frac{3}{2}\sin\frac{1}{2}t$

$y = \underbrace{5t^2}_{u}\underbrace{e^{-2t}}_{v}$

$y' = (5t^2)(-2e^{-2t}) + (e^{-2t})(10t)$

$= -10t^2e^{-2t} + 10te^{-2t}$

$$\begin{array}{r} 100 \\ 100 \\ 100 \\ 150 \\ \hline 450 \end{array}$$

Billy

$$\frac{387}{450}$$

$$\frac{31}{31}$$

$$86 = \frac{387+31}{450+31}$$

Bobby

$$\frac{387}{450}$$

$$\frac{127}{127}$$

$$\frac{387+127}{450+127} = 89$$

$$y = \overset{C}{\cancel{C_1}} \sin 4t + \overset{D}{\cancel{C_2}} \cos 4t$$

$$y' = 4C_1 \cos 4t - 4C_2 \sin 4t$$

$$y'' = -16C_1 \sin 4t - 16C_2 \cos 4t$$

$$y'' = -16(C_1 \sin 4t + C_2 \cos 4t)$$

$y = 1.2$ when $t = 0$

$$\boxed{\begin{aligned} y(0) &= 1.2 \\ y'(0) &= 0 \end{aligned}}$$

Demonstrate that $y = C_1 \sin 4t + C_2 \cos 4t$ is a solution to $\frac{d^2y}{dt^2} = -16y$.

$y' = 4C_1 \cos 4t - 4C_2 \sin 4t$

$y'' = -16C_1 \sin 4t - 16C_2 \cos 4t$

$LHS = \frac{d^2y}{dt^2} = -16C_1 \sin 4t - 16C_2 \cos 4t$

$RHS = -16y = -16C_1 \sin 4t - 16C_2 \cos 4t$

$LHS = RHS$, so $y = C_1 \sin 4t + C_2 \cos 4t$ is a sol to $\frac{d^2y}{dt^2} = -16y$.

Is $y=10e^{-2t}$ a solution to $y''+9y=26e^{-2t}$

$y'=-20e^{-2t}$, $y''=40e^{-2t}$

$LHS=y''+9y=40e^{-2t}+9(10e^{-2t})=130e^{-2t}\neq RHS$

$y=10e^{-2t}$ is not a solution to $y''+9y=26e^{-2t}$

Is there any value of C for which $y = Ce^{-2t}$ is a solution to $y'' + 9y = 26e^{-2t}$?