

$\frac{dv}{dt} - 2tv = 11t^{10}e^{t^2}$, $v(0) = 3$. $I(t) = e^{\int(-2t)dt} = e^{-t^2}$. Multiply the differential equation by $I(t)$ to get $e^{-t^2} \frac{dv}{dt} - 2te^{-t^2}v = 11t^{10} \Rightarrow (e^{-t^2}v)' = 11t^{10} \Rightarrow e^{-t^2}v = \int 11t^{10} dt = t^{11} + C \Rightarrow v = t^{11}e^{t^2} + Ce^{t^2}$. $3 = v(0) = 0 \cdot 1 + C \cdot 1 = C$, so $v = t^{11}e^{t^2} + 3e^{t^2}$.