Quiz 3

Name: _____

1. Find a solution to the differential equation below satsfying the initial condition $y(0) = 5$.

$$\frac{dy}{dt} = 10t^4 + e^t.$$

By using your derivative knowledge, you know you'll need t^5 in your solution. But taking a derivative of that gives you $5t^4$, and you really need a $10t^4$. To fix your guess, multiply it by 2, so the first part of the answer should be $y = 2t^5$. You also know it needs e^t, since that gives the derivative e^t, so your solution is now $y = 2t^5 + e^t$. However, you could also add any constant, so the general solution is

$$y = 2t^5 + e^t + C.$$

Plugging in $y = 5$ and $t = 0$, you see

$$5 = 0 + 1 + C,$$

(don't forget that $e^0 = 1$!), so $C = 4$. Thus the solution is $y = 2t^5 + e^t + 4$.