2020 Differential Equation Python Quiz 2

1. For the equation $y'' = t^2 + 5sin(t)$, do the following:

a) Solve the given differential equation, with $y(0) = 1$ and $y(0)' = 0$ as the initial value. (20 points)
Use time range between 0 and 1 with 10 equally spaced points.
Hint: You need to solve it both, numerically(odeint) and symbolically(diff)
b) Plot the solution (20 points)
Hint: For this part use your numerical solution.
Hint: You have to have two separate plots. One is *y* with respect to time and another is *y'* with respect to *y*
c) Obtain the the first order derivative of the solution obtained in part a) (10 points)
Hint: You won't be able to take Derivative of Derivative object, so you need to think ;)
d) Obtain the the second order derivative of the solution obtained in part a) (10 points)

2. Consider the equation $\frac{dy}{dt} = 2cos(t) + \frac{-t}{10}e^{\frac{-t}{10}}$. For this equation, do the following:

a) Plot the slope field (quiver command) (20 points)
b) On the same figure, plot a particular solution with initial value $y(t = 0) = 1$ (20 points)