Solutions of Differential Equations

GROUP MEMBERS:

1. _____________________________
2. _____________________________
3. ______________________________
4. ______________________________

1. Consider the differential equation: \( y'(t) = 3 y(t) \) or equivalently
\[
y'(t) - 3 y(t) = 0.
\]
Recall that \( y'(t) = \frac{dy}{dt} \)

Guess and Check method: You guess a possible solution and see if it works. Take turns; write out your work and explain to your team what you are doing.

a. (Person 1) Does the function \( y(t) = t^2 \) solve the differential equation? I.e. when you plug the function into the equation, does it make the equation true?

b. (Person 2) Does the function \( y(t) = e^t \) solve the differential equation?

c. (Person 3) Does the function \( y(t) = e^{3t} \) solve the differential equation?

d. (Person 4) Does the function \( y(t) = 5e^{3t} \) solve the differential equation?
2. Everybody do this individually on your own sheet.

Consider the differential equation:

\[ y''(t) + 16 y(t) = 0. \]

Recall that \( y''(t) = \frac{d^2y}{dt^2} \)

a. Does the function \( y(t) = t^2 \) solve the differential equation?

b. Does the function \( y(t) = e^t \) solve the differential equation?

c. Does the function \( y(t) = \sin(t) \) solve the differential equation?

d. Does the function \( y(t) = \sin(4t) \) solve the differential equation?

e. Can you find any other functions that solve the differential equation? (When you are done with part 2e, discuss the results with your group in part (3) – on the back of the group sheet).
3. Group discussion: Write down as many solutions of $y''(t) + 16 y(t) = 0$ as you can.