For each of the following, determine where the student’s confusion is and try to address the problem.

1. Find the function \( y(t) \) that satisfies the differential equation \( \frac{dy}{dt} - 2ty = 6t^2e^{t^2} \) and the condition \( y(0) = 3 \).

2. Solve the following initial value problem: \( \frac{dy}{dt} + 6y = 6t \) with \( y(1) = 2 \).

3. Use Euler’s method with step size 0.2 to estimate \( y(1) \), where \( y(x) \) is the solution of the initial-value problem \( y' = 5x + y^2 \), \( y(0) = 1 \).

4. Evaluate the integral: \( \int_{3}^{5} (t^3 - t^2) \, dt \)

5. Find positive numbers \( x, y \) such that \( xy = 21 \), and \( x + y \) is as small as possible.

6. Find a point \( c \) satisfying the conclusion of the MVT for the following function and interval.
   \( f(x) = x^{-7} \) \quad [1, 9]
7. Determine the intervals on which the given function is concave up or down and find the points of inflection. Let \( f(x) = (x^2 - 10) \exp(x) \)

8. Calculate the Taylor polynomials \( T_2(x) \) and \( T_3(x) \) centered at \( x = \frac{\pi}{4} \) for \( f(x) = \tan(x) \).

9. Calculate \( \int 2 \frac{\tan^3(\ln x)}{x} \, dx \)

10. Calculate the integral \( \int x^4 \sinh(x^5 + 1) \, dx \).

11. Evaluate the integral : \( \int \frac{x^2}{x^2 + 9} \, dx \)