Question 1. Find the Laplace Transform of the following functions:

(i) \( f(t) = \cosh(3t) - 2e^{-3t} + 1 \)  
(ii) \( g(t) = 3t^3 - 5t^2 + t + 5 \)  
(iii) \( h(t) = 2\sin(-3t) + 3\cos(-3t) \)

Question 2. Find the Inverse Laplace Transform of the following functions:

(i) \( F(s) = \frac{2s+3}{s^2-4s+3} \)  
(ii) \( G(s) = \frac{s+1}{s^2+25} \)

Question 3. Use the Laplace Transform to solve the following initial value problems:

(1) \( y'' + 5y' - 6y = 0 \), \( y(0) = -1 \), \( y'(0) = 3 \)
(2) \( y'' + 4y' + 3y = e^{-t} \), \( y(0) = -1 \), \( y'(0) = 2 \)

Question 4. Use Gaussian Quadrature of order 4 to estimate the value of the integral

\[ \int_0^3 \frac{x}{1+x} \, dx. \]

Round your answer to 5 decimal places. Compute the exact value the integral and find the error.

Question 5. Use Euler Method with step size \( h = 0.1 \) to approximate the values of the function \( y \) solution to the IVP:

\( y' = 3x - 2y, \ y(0) = 1 \)
on the interval \([0, 0.5]\). Then solve the above differential equation and make a table to compare your approximations with the true values.