IN101 – Calculus (1)

Instructions:

1. Each step on the equations will be counted for marks. You must not answer in one line.
2. Scan the notebook and upload it in the portal as HW_4_studentid.pdf
3. Deadline for homework submission 25/11/2025

1. Differentiate:

   a. $y = (4x^2 + 3)(2x + 5)$

   b. $y = x^3 e^x$

   c. $y = \dfrac{x}{e^x}$

   d. $f(x) = (3x^2 - 5x)e^x$

   e. $f(t) = \dfrac{5t}{t^3 - t - 1}$

   f. $g(t) = \dfrac{3 - 2t}{5t + 1}$

2. Find $f'(x)$ and $f''(x)$:

   a. $f(x) = x^2 e^x$

   b. $f(x) = \dfrac{x}{x^2 - 1}$

   c. $f(x) = \sqrt{x} e^x$

   d. $f(x) = \dfrac{x}{1 + \sqrt{x}}$

3. Find an equation of the tangent line to the given curve at the specified point.

   a. $y = \dfrac{x^2}{1+x}, \ \left(1, \dfrac{1}{2}\right)$

   b. $y = \dfrac{1+x}{1+e^x}, \ \left(0, \dfrac{1}{2}\right)$