Problem 1. Find the derivative of the following functions. Simplify where appropriate

i) $y = (5x^4 + 1)^2$

ii) $y = \sqrt[5]{-x^3 - 4}$

iii) $f(x) = (4x^5 - 1)\sqrt[3]{x + 1}$

iv) $g(x) = \sqrt{-x^4 - 1}(-x - 2)$

v) $y = (3x - 1)(-3x^2 - 4)^{-3}$

vi) $y = \left(\frac{5x^5 - 3}{-3x^3 + 1}\right)^3$

vii) $f(x) = \left(\frac{x^5 + 4}{x^2 - 5}\right)^{\frac{1}{5}}$

viii) $g(x) = \frac{\sqrt[5]{x^2 - 3}}{-x - 5}$

ix) $h(t) = (2t - 1)^4 + (2t + 1)^4$

x) $f(x) = \sqrt{\sqrt{x^3 + 1}}$

Problem 2. Find $\frac{dy}{dx}$, $\frac{du}{dx}$ and $\frac{dy}{dx}$ for each problem

1. $y = u^{5/2}$ and $u = 3x^2 - 1$.
2. $y = 2u^3 + 1$ and $u = x^2 + 1$
3. $y = \frac{1}{\sqrt{u}} - \sqrt{u}$ and $u = x^2 + 7$
4. $y = \frac{1}{u}$ and $u = \sqrt{x} + 1$

Problem 3. Find the equation of the tangent line at the given point for the following problems.

1. $f(x) = (1 - x)(x^2 - 1)^2$, $(2, -9)$
2. $f(x) = \left(\frac{x+1}{x-1}\right)^3$, $(3, 4)$