Math 165 - Quiz 4A, Rules - solutions

Problem 1 Find the derivatives of the following functions.

\[ a) \quad f(x) = x^6 - 2x^5 + \pi x^3 - x + 9 \]
\[ b) \quad g(u) = e^u(1 - u^2) \]
\[ c) \quad h(t) = \frac{t^2 - 1}{t^2 + t + 4} \]

Solution

\[ a) \quad f'(x) = 6x^5 - 10x^4 + 3\pi x^2 - 1 \]
\[ b) \quad g'(u) = e^u(1 - u^2) - 2ue^u \]
\[ c) \quad h'(t) = \frac{2t(t^2 + t + 4) - (t^2 - 1)(2t + 1)}{(t^2 + t + 4)^2} \]

Problem 2 Suppose \( f(x) \) is a function with \( f(3) = 4 \) and \( f'(3) = 5 \). Also, \( g(x) \) is a function with \( g(3) = 1 \) and \( g'(3) = 6 \). What is the derivative of the function

\[ h(x) = f(x)g(x) \]

at \( x = 3 \)?

Solution We need the Product Rule, and apply it at \( x = 3 \):

\[ h'(3) = 5 \cdot 1 + 4 \cdot 6 = 29. \]