Review questions from Chapter 1 and section 3.1

(1) Use the definition \( f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} \) of the derivative to find \( f'(x) \) when \( f(x) = x^{-1/2} \).

(2) Use the definition \( f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} \) of the derivative to find \( f'(x) \) when \( f(x) = x^{-2} \).

(3) Assume \( x \) is a number such that \( \tan x = 7 \) and \( \sin x < 0 \). Find \( \sec x \).

(4) Simplify \( \sin(\sin^{-1} x), \cos(\sin^{-1} x), \sec(\sin^{-1} x), \tan(\sin^{-1} x) \).

(5) Consider the function \( f(x) = \frac{x - 8}{1 + 7x} \). Find a formula for the inverse function \( f^{-1}(x) \).

(6) Solve for \( x \) in the equation \( e^{4x+3} = 2e^{3-x} \).

(7) Solve for \( x \) in the equation \( \sqrt{e^{8x-6}} = e^{x^2} \).

(8) Explain why the function \( f(x) = x^6 + 3 \) is not a one-to-one function.

(9) Which of the given functions is even, which of the given functions is odd, and which of the given functions is neither? Explain carefully.

\[
f(x) = x^4 \sqrt{1 + x^2} \quad g(x) = x^3 + 1 \quad h(x) = x \sqrt{1 + x^2}
\]

(10) Find functions \( f(x) \) and \( g(x) \) such that \( f(x) \) is even, \( g(x) \) is odd and \( f(x) + g(x) = 5x^5 - 7x^4 - 5x^3 + 8x^2 - x + 10 \).

(11) Express the function \( f(x) = \sqrt{1 + \cos^2 x} \) as the composition of three simpler functions.