Differentiation: Trigonometry, logarithm, and exponent functions

Find the 1st derivative of each function.

I. Trigonometry:

a) $f(x) = 2x(\cos x)$

b) $y = \tan^4(3 + 4x)$

c) $g(x) = \dfrac{1 - \sin x}{1 + \sin x}$

II. Logarithms:

a) $y = \ln(x^2)$

b) $h(x) = \dfrac{\ln x}{x^2}$

c) $f(x) = \ln\sqrt{x^2 - 4}$

III. Exponents:

a) $y = x^2 e^x$

b) $y = 3^{x-1}$

c) $f(x) = 4e^{2x}$