(1) [4] Differentiate $y = \ln\left(xe^{-x} - e^{-x}\right)$

(2) [3] Differentiate $y = \dfrac{e^x}{x^2}$

(3) [8] Use logarithmic differentiation (or some other method) to determine the derivative of

$$y = (\cos x)^{1/x}$$