(1) [**5 points**] Differentiate

$$y = \ln\left(e^{-x} + xe^{-x}\right)$$

(2) [**5 points**] Use logarithmic differentiation to find the derivative:

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

(3) [5 points] Gravel is being dumped from a conveyor belt at a rate of 10 m^3/min to form a pile in the shape of a cone. The cone-shaped pile of gravel grows in such a way that the height is always equal to the diameter of the base. How fast is the height of the pile increasing when the pile is 5 m tall? State units with your answer. (Recall that the volume of a cone of base radius r and height h is $V = \pi r^2 h/3$.)