Solutions

No Work = No Credit. Write Legibly. Box your final result.

1. [10 points] Find the derivative of the function. Simplify where possible.

$$y = \arccos\left(e^{2x}\right) \tag{1}$$

Take cos of both sides of (1), to obtain

$$\cos y = e^{2x}. \tag{2}$$

Equation (2) can be connected with a right triangle, where y is the angle, e^{2x} is the "adjacent" side and 1 is the hypotenuse. To find "opposite" side, we use Pythagorean theorem, i.e., $(e^{2x})^2 + \text{opposite}^2 = 1^2$. Thus, opposite $= \sqrt{1 - e^{4x}}$. This triangle is shown in Figure 1.

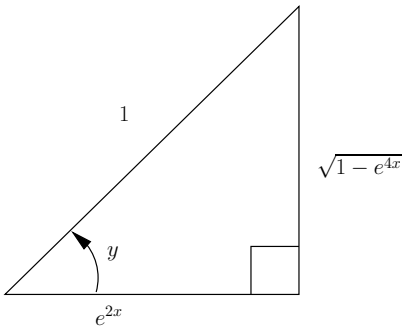

Figure 1: Right triangle given by (2).

Taking a derivative of both sides of (2) with respect to x, yields

$$-\sin y \frac{dy}{dx} = 2e^{2x}. \tag{3}$$

Using the right triangle, see Figure 1, we see that $\sin y = \sqrt{1 - e^{4x}}$. Thus, (3) can be written as

$$\frac{dy}{dx} = \boxed{-\frac{2e^{2x}}{\sqrt{1 - e^{4x}}}}$$