9. [13 points] Let $\mathcal{C}$ be the curve defined by the equation

$$\ln(xy) = x^2.$$

Note that the curve $\mathcal{C}$ satisfies

$$\frac{dy}{dx} = \frac{y(2x^2-1)}{x}.$$

a. [4 points] Exactly one of the following points lies on $\mathcal{C}$. Circle that <u>one</u> point.

$(0,1)$ $(1,0)$ $(1,1)$ $(1,e)$ $(e,1)$ (e,e)

Then find an equation for the line tangent to $\mathcal{C}$ at the point you chose above.

Answer: $y =$ _____

b. [4 points] Find all points on $\mathcal{C}$ with a horizontal tangent line. Give your answers as ordered pairs (coordinates). Show your work. Write NONE if no such points exist.

Answer: $(x, y) =$ _____

c. [5 points] Consider the curve $\mathcal{D}$ defined by

$$y + 2^x y^4 = 3 - \sin(x^2).$$

Find a formula for $\dfrac{dy}{dx}$ in terms of x and y. To earn credit for this problem, you must compute this by hand and show every step of your work clearly.

Answer: $\dfrac{dy}{dx} =$