

5. [9 points] Consider the curve \mathcal{C} defined by

$$e^{\pi xy} = ay^2 + x^2$$

where a is a positive constant.

- a. [6 points] For this curve \mathcal{C} , find a formula for $\frac{dy}{dx}$ in terms of x and y . The constant a may appear in your answer. Remember to show every step of your work clearly.

Answer: $\frac{dy}{dx} =$ _____

- b. [1 point] Let $a = 1$. Exactly one of the following points (x, y) lies on the curve \mathcal{C} . Circle that one point.

(0, 3)

(1, 2)

(2, -1)

(0, -1)

(e^π , 0)

- c. [2 points] With $a = 1$ as above, is the tangent line to the curve \mathcal{C} at the point you chose in (b) increasing, decreasing, or is there not enough information to determine this? Circle your one choice and then justify your answer.

The tangent line to the curve \mathcal{C} at the point circled in (b) is

i. increasing.

ii. decreasing.

iii. NOT ENOUGH INFORMATION

Justification: