MAT133

WRITTEN HOMEWORK 5 **Due: Thursday, July 27, 2023 at 11:59pm**

All solutions to be written in appropriate details. Please submit your solution to Crowdmark.

NOTE: *This version contain solutions to the problems. Solutions are not written in best details, so students are expected to fill in some of these gaps in their submissions.*

Question 1. Consider the implicit curve C given by the equation

$$C: \ y^2e^{2x} = 3y + x^2.$$

(a) Find $\frac{dy}{dx}$.

(b) Find $\frac{dx}{dy}$.

(c) Find the equation of the tangent line to C at the point $(0, 3)$.

Explain your steps.

Solution **(a)** Here, I provide with the main steps to get $\frac{dy}{dx}$ and skip some computational steps.

Using the implicit differentiation, we apply $\frac{d}{dx}$ to both sides to get

$$2y\left(\frac{dy}{dx}\right)e^{2x} + 2y^2e^{2x} = 3\left(\frac{dy}{dx}\right) + 2x.$$