

**MATH 31 - Calculus. Homework 4. Due Th. 03/13/2025.** Professor Luis Fernández

NAME: \_\_\_\_\_

**Do not write your answers here.**

Write your answers in other sheets and **STAPLE them to this one.**

1. Use implicit differentiation to find an equation of the tangent line to the curve  $y^2(6 - x) = x^3$  at the point  $(2, \sqrt{2})$ .
2. Consider the equation  $\sqrt{x} + \sqrt{y} = \sqrt{18}$ .
  - (a) Find the equation of the tangent line to the curve at the point  $(2, 8)$  in the curve.
  - (b) Find the  $x$  and  $y$  intercepts of the tangent line you got in part 1.
  - (c) Show that the sum of the intercepts is always equal to 18.
3. Suppose that  $f$  and  $g$  are differentiable functions that satisfy  $f(g(x)) = x$  for all  $x$ . Also suppose that  $g(4) = 3$  and that  $f'(3) = 7$ . Find  $g'(4)$ .
4. **Challenge! (+2 extra credit)** Consider the equation  $\sqrt{x} + \sqrt{y} = \sqrt{c}$  ( $c$  is a given constant).
  - (a) Find the equation of the tangent line to the curve at a point  $(a, b)$  in the curve (the expression you will get will be written using  $a$ ,  $b$  and  $c$ ).
  - (b) Find the  $x$  and  $y$  intercepts of the tangent line you got in part 1.
  - (c) Show that the sum of the intercepts is always equal to  $c$ .