

MATH 1A MIDTERM 2 (PRACTICE 1)
PROFESSOR PAULIN

**DO NOT TURN OVER UNTIL
INSTRUCTED TO DO SO.**

CALCULATORS ARE NOT PERMITTED

**YOU MAY USE YOUR OWN BLANK
PAPER FOR ROUGH WORK**

**SO AS NOT TO DISTURB OTHER
STUDENTS, EVERYONE MUST STAY
UNTIL THE EXAM IS COMPLETE**

**REMEMBER THIS EXAM IS GRADED BY
A HUMAN BEING. WRITE YOUR
SOLUTIONS NEATLY AND
COHERENTLY, OR THEY RISK NOT
RECEIVING FULL CREDIT**

**THIS EXAM WILL BE ELECTRONICALLY
SCANNED. MAKE SURE YOU WRITE ALL
SOLUTIONS IN THE SPACES PROVIDED.
YOU MAY WRITE SOLUTIONS ON THE
BLANK PAGE AT THE BACK BUT BE
SURE TO CLEARLY LABEL THEM**

Name: _____

Student ID: _____

GSI's name: _____

This exam consists of 5 questions. Answer the questions in the spaces provided.

1. Determine the derivatives of the following functions (you do not need to use the limit definition):

(a) (10 points)

$$e^{\frac{\arccos(x)}{x}}$$

Solution:

(b) (15 points)

$$\sqrt{x}^{\sqrt{x}}$$

Solution:

2. (25 points) Find the equations of the tangent and normal lines to the following curve at the given point.

$$x^2 + 4xy = 13 - y^2, \quad (2, 1).$$

Solution:

3. (25 points) Show that the following equation has at most 2 real solutions. Be sure to carefully justify your answer clearly stating any results you use from lectures.

$$3x^6 + 4x^2 + c = 0, \quad \text{where } c \text{ is any constant}$$

Solution:

4. (25 points) Sketch the following curve. Be sure to indicate asymptotes, local maxima and minima and concavity. Show your working on this page and draw the graph on the next page.

$$y = \frac{x^3}{(x+1)^2}$$

Solution:

Solution (continued) :

PLEASE TURN OVER

5. (25 points) Find the point on the curve $y^2 + 9x^2 = 36$ which is closest to $(1,0)$. Hint: When minimizing the objective function make sure you think carefully about the domain.

Solution: