

# Math 126 D Autumn 2024 Midterm II

November 19, 2024

Name \_\_\_\_\_

Student Number \_\_\_\_\_

## Instructions

- These exams will be scanned. **Please write your name and student number clearly.**
- There are 4 questions. The exam is out of 50 points.
- You are allowed to use one page of notes written only on one side of the sheet in your own handwriting. No printed material allowed. **Hand in your notes with your exam.**
- You can only use a Ti-30x IIS calculator. Unless otherwise stated, you have to give exact answers to questions. ( $\frac{2\ln 3}{\pi}$  and  $1/3$  are exact, 0.699 and 0.333 are approximations for those numbers.)
- Show your work. If we cannot read or follow your work, we cannot grade it. **You may not get full credit for a right answer if your answer is not justified by your work.**

1. (10 points) Find the equation of the tangent plane to the surface

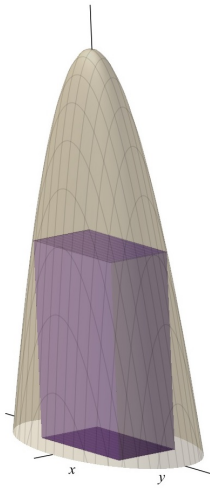
$$x^3 + y^3 = 3xyz$$

at the point  $\left(1, 2, \frac{3}{2}\right)$  and use it to approximate the value of  $b$  if  $(0.85, b, 1.44)$  is on this surface.

2. (15 points) Find the volume of the largest box sitting on the  $xy$ -plane which fits under the paraboloid

$$z = 9 - 4x^2 - y^2.$$

Make sure you justify that you have found a maximum using second derivatives.



3. (10 points) Evaluate the integral

$$\int_0^3 \int_{x^2}^9 \frac{x^3}{\sqrt{x^4 + y^2}} dy dx$$

4. (15 points) Find the volume of the solid under the surface  $z = 1 - x^2 - y^2$ , over the  $xy$ -plane, and inside the cylinder  $x^2 + y^2 - x = 0$ .

*This page is empty. If you continued a question here, make a note on the question page so we look here.*