

Winter 2005

Business Calculus II Second Midterm

Name: _____

UO ID number: _____

Signature: _____

Answer ALL questions.

Each question is worth FOUR points.

Make sure I can read your answers clearly!

1	2	3	4	5	TOT.

1. (a) Use integration by substitution to compute the following indefinite integral:

$$\int \frac{2x}{x^2 + 1} dx$$

(b) Solve the differential equation

$$\frac{dy}{dx} = \frac{2xy}{x^2 + 1}$$

subject to the initial condition that $y = 1$ when $x = 0$.

2. (a) Calculate the area of the region below the curve $y = x^2 + x + 1$, to the right of $x = 0$, to the left of $x = 1$, and above the x -axis.

(b) Write down the equation of the plane passing through the points $(0, 0, 2)$, $(0, 1, 5)$ and $(1, 0, 4)$ in the form $z = mx + ny + b$.

3. Consider the surface $z = xe^y + 2y + 3$.

(a) Compute $\frac{\partial z}{\partial x}\big|_{x=0,y=0}$ and $\frac{\partial z}{\partial y}\big|_{x=0,y=0}$.

(b) Write down the equation for the tangent plane to this surface at the point $(0, 0, 3)$.

4. American Airlines requires that the total outside dimensions (length + width + height) of a checked bag not exceed 63 inches. What are the dimensions of the largest volume bag that you can check on to an American flight? SHOW YOUR WORKING...

5. Let $f(x, y) = x^3 - 3xy + 8y^3$.

(a) Compute the partial derivatives $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$.

(b) Find all the critical points of the function $f(x, y)$.

(c) By thinking about the slice $y = 0$ through the surface $z = f(x, y)$, decide whether the point $(x, y, z) = (0, 0, 0)$ is a local minimum, a local maximum, or neither of these. Explain your reasoning.