

Math 126 D - Spring 2011
Mid-Term Exam Number Two
May 17, 2011

Name: _____ Student ID no. : _____

Signature: _____ Section: _____

1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

- Complete all questions.
- You may use a scientific, non-graphing calculator during this examination. Other electronic devices are not allowed, and should be turned off for the duration of the exam.
- If you use a trial-and-error or guess-and-check method when an algebraic method is available, you will not receive full credit.
- You may use one hand-written 8.5 by 11 inch page of notes.
- Show all work for full credit.
- You have 50 minutes to complete the exam.

1. Find and classify all critical points of the function $f(x, y) = x^2y + x^2 + y^2$.

2. Find the equation of the tangent plane to the surface

$$z = xe^{y^2} - \frac{y}{x+y}$$

at the point $(0, 1, -1)$.

3. You wish to build an open-top steel box with rectangular sides. The base will be made with thick steel which costs \$50 per square meter. The sides will be made with thin steel which costs \$20 per square meter. The box will have a volume of 2 cubic meters.
- What dimensions will minimize the cost of the box?

4. Evaluate the following integrals. It may be helpful to reverse the order of integration on either or both of these integrals.

$$(a) \int_e^{e^2} \int_{\frac{1}{x}}^{\frac{2}{x}} e^{xy} dy dx$$

$$(b) \int_0^2 \int_{x^2}^4 xy \sin y^3 dy dx$$

5. Evaluate the integral

$$\iint_D xy \, dA$$

where D is the region entirely contained in the first quadrant which is bounded by the circles $x^2 + y^2 = 1$ and $x^2 + y^2 = 4$, the y -axis, and the line $y = x$.