

MAT 203 MIDTERM II

PRACTICE PROBLEMS

1. (a) (5 pts) Compute the limit $\lim_{(x,y) \rightarrow (0,1)} \frac{y^2 \sin x}{x}$

(b) (5 pts) Compute the directional derivative of $f(x,y) = xy^2 - yx^2$ in the direction $\vec{v} = \langle -1, 1 \rangle$.

- 2.** (10 pts) Find and classify all critical points of the function $f(x, y) = x^3 - 27x + 4y^2$.

- 3.** (10 pts) Compute the double integral $\iint_D x^2 dx dy$ where D is the region in the xy -plane of all (x, y) such that $x^2 \leq y \leq 2 - x^2$.

4. (10 pts) Compute the triple integral $\iiint_C ze^{x^2+y^2} dx dy dz$, where C is the region described by the inequalities $x^2 + y^2 \leq 4$ and $1 \leq z \leq e$.