

MATH 11: MULTIVARIABLE CALCULUS
FALL 2018
HOMEWORK #5

Please turn in your completed homework assignment by leaving it in the boxes labeled “Math 11” in the hallway outside of Kemeny 105 anytime before 3:30 p.m. on **Wednesday, October 17**.

Problem 1. Find the extreme values of $f(x, y) = e^{-xy}$ on the domain $x^2 + 4y^2 \leq 1$. For part of the solution, use the method of Lagrange multipliers.

Problem 2.

- (a) Show that if f is a constant function of two variables (so $f(x, y) = k$ for some constant k) and $R = [a, b] \times [c, d]$, then

$$\iint_R k \, dA = k(b-a)(d-c).$$

- (b) Use part (a) to show that

$$0 \leq \iint_R \sin(\pi x) \cos(\pi y) \, dA \leq \frac{1}{32},$$

where $R = [0, 1/4] \times [1/4, 1/2]$.

Problem 3. In evaluating a double integral over a region D , a sum of iterated integrals was obtained as follows:

$$\iint_D f(x, y) \, dA = \int_0^2 \int_0^{\sqrt{y}} f(x, y) \, dx \, dy + \int_2^4 \int_{y-2}^{\sqrt{y}} f(x, y) \, dx \, dy.$$

Sketch the region D and express the double integral as an iterated integral with reversed order of integration.