

MATH 105: PRACTICE PROBLEMS FOR CHAPTER 13: SPRING 2011

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Question 1 : Define the following terms:

- (1) What does it mean for a function $f : \mathbb{R}^2 \rightarrow \mathbb{R}$ to be bounded?
- (2) Define a simple region.

Question 2 : Compute

$$\int_{x=1}^4 \int_{y=\sqrt{x}}^{x^2} y dy dx.$$

Interchange the order of integration. Write down what the new bounds of integration are, and compute the new double integral.

Question 3 : Let f be a function of class C^2 . Must

$$\int_{x=0}^{\infty} \int_{y=0}^{\infty} f(x, y) dy dx = \int_{y=0}^{\infty} \int_{x=0}^{\infty} f(x, y) dx dy,$$

or could there be a function f such that this fails?

Question 4 : Let D be the region in the plane where $x, y \geq 0$ and $3x \geq 2y \geq x$. Write down (but do not evaluate) the integral for the function e^{xy} over this region.

Question 5 : Prove

$$2 \leq \int_{x=0}^1 \int_{y=0}^2 e^{x+y} dy dx \leq 2e^3.$$