

Math 215 Homework 4- Continued

READ ME: Except where indicated, merely finding the answer to a problem is not enough to receive credit. You must show how you arrived at that answer.

1) (2 points) Let

$$f(x, y) = \begin{cases} 1, & 0 \leq x - y \leq 1 \\ -1, & 0 < y - x \leq 1 \\ 0, & \text{otherwise.} \end{cases}$$

Show that

$$\int_0^\infty \left(\int_0^\infty f(x, y) dx \right) dy \neq \int_0^\infty \left(\int_0^\infty f(x, y) dy \right) dx.$$

Does this contradict Fubini's theorem?

2) (3 points) Calculate $\int_{\mathcal{R}} \sin \left(\cos^{-1} \left(\frac{x}{\sqrt{x^2 + y^2}} \right) \right) dA$ where \mathcal{R} is the region bounded by the curves $y = \sqrt{-6x - x^2}$ and $y = 0$.