

Quiz 9; Wednesday, March 30
MATH 53 with Professor Stankova
Section 109; 11-12
GSI: Eric Hallman

Student name:

You have 10 minutes to complete the quiz. Calculators are not permitted, and remember to show your calculations and explain your reasoning in order to receive full credit.

1. Find the integral of the function $f(x, y) := x + y$ over the triangle with vertices $(-1, 1)$, $(0, 0)$, and $(1, 1)$.

The simpler way to set up the integral is to express the bounds for x as a function of y :

$$\begin{aligned}\iint_D f(x, y) dA &= \int_{y=0}^1 \int_{x=-y}^y x + y dx dy \\ &= \int_{y=0}^1 \frac{1}{2}x^2 + xy \Big|_{-y}^y dy \\ &= \int_{y=0}^1 2y^2 dy \\ &= \frac{2}{3}y^3 \Big|_0^1 \\ &= 2/3.\end{aligned}$$

One could also interpret this integral geometrically: finding the volume of a pyramid (on its side) with rectangular “base” $(-1, 1, 0)$, $(-1, 1, 1)$, $(1, 1, 0)$, $(1, 1, 1)$ and height 1 (the top of the pyramid is at the origin).