

MATH 130A Review: Fubini Theorem

1. Calculate $\iint_R (xy + x) dA$ where $R = \{(x, y) : 0 \leq x \leq 1, 0 \leq y \leq 2\}$.

Solution:

$$\int_0^1 \int_0^2 (xy + x) dy dx = \int_0^1 x \frac{1}{2}(2)^2 + x(2) dx = 1 + 1 = 2$$

2. Calculate $\iint_R x e^{xy} dA$ where $R = \{(x, y) : 0 \leq x \leq \pi, 0 \leq y \leq 1\}$.

Solution:

$$\begin{aligned} \int_0^\pi \int_0^1 x e^{xy} dy dx &= \int_0^\pi (e^{x(1)} - e^{x(0)}) dx \\ &= \int_0^\pi (e^x - 1) dx \\ &= e^\pi - e^0 - \pi \\ &= e^\pi - 1 - \pi \end{aligned}$$