

Math 25b Integration worksheet

Define $\gamma : [0, 1]^2 = \{(u^1, u^2) : 0 \leq u^i \leq 1\} \rightarrow \mathbb{R}^3 = \{(x^1, x^2, x^3)\}$ by: $x^1 = u^1 \cos(\pi u^2)$, $x^2 = u^1 \sin(\pi u^2)$, $x^3 = u^2$. Let $\alpha = x^1 dx^2 + x^2 dx^3$.

a) Find $\gamma^* d\alpha$.

b) Find $\int_{\gamma} d\alpha$.

c) Find $\partial\gamma$ as a signed sum of 1-cubes, and label these 1-cubes clearly on the sketch above.

d) **Set up** the integrals for $\int_{\partial\gamma} \alpha$, ready for evaluation.

e) Find $\int_{\partial\gamma} \alpha$.