

MTH 252 Lab

Trigonometric Integrals

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Purpose

The method of trigonometric integrals is based on substitution. In this method, we begin by choosing du , then we recover u from that. We then use the Pythagorean Theorem to set up our integral, then substitute, and we finally integrate!

- (a) We need the Pythagorean Theorem to evaluate trigonometric integrals. Write down the Pythagorean Theorem in terms of sine and cosine. Also write down the Pythagorean Theorem in terms of tangent and secant.
- (b) We need the Pythagorean Theorem *and* double-angle formulas to evaluate trigonometric integrals when the powers of sine and cosine are both even. Write down the double-angle formulas for sine and cosine.

Prompts

1. Evaluate $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^3 x \, dx$.
2. Evaluate $\int \cos^3 y \sin^5 y \, dy$.
3. Evaluate $\int \sin^3 \theta \, d\theta$.
4. Evaluate $\int \sin^4 \theta \, d\theta$.
5. Evaluate $\int \cos^4 \theta \, d\theta$.
6. Evaluate $\int \sin^4 x \cos^2 x \, dx$.
7. Evaluate $\int x \sin x \, dx$.
8. Evaluate $\int x \sin(x^2) \, dx$.