W02 - Homework

Stepwise problems - Thu. 11:59pm

Trig power products

01

Somewhat odd power product

Compute the integral:

$$\int \sin^2 x \cdot \cos^3 x \, dx$$

02

Tangent and secant both even

Compute the integral:

$$\int \tan^2 x \cdot \sec^2 x \, dx$$

03

All even power product

Compute the integral:

$$\int \sin^4 x \cdot \cos^2 x \, dx$$

Trig substitution

04

Trig sub

Compute the definite integral:

$$\int_0^{1/2} \frac{x^2}{\sqrt{1-x^2}} \, dx$$

05

Trig sub

Compute the integral:

$$\int \frac{dx}{\sqrt{x^2+4}}$$

Regular problems - Sat. 11:59pm

Trig power products

06

All odd power product

Compute the integral:

$$\int \cos^7 x \, dx$$

07

Tangent and secant mixed parity

Compute the integral:

$$\int \tan^3 x \, \sec^2 x \, dx$$

- (a) Using $du = \sec^2 x \, dx$.
- (b) Using $du = \sec x \, \tan x \, dx$.

08

Power product with negative power

Compute the integral:

$$\int \sin 7x \, \sec^5 7x \, dx$$

Trig substitution

09

Trig sub

Compute the integral:

$$\int \frac{dx}{x^3\sqrt{x^2-4}}$$

10

Trig sub

Compute the integral:

$$\int \frac{dx}{\sqrt{x^2+4x+13}}$$

Hint: complete the square and then substitute.

11

Trig sub

Compute the integral:

$$\int \frac{x^2}{(x^2+1)^{3/2}}\,dx$$

12

Double sub: u-sub then trig sub

Compute the definite integral:

$$\int_0^{\pi/2} \frac{\cos x}{\sqrt{1+\sin^2 x}}\,dx$$

13

Trig sub for electric charge

A charged wire lies on the x-axis running from x_1 to x_2. The electric field at the point $p = (0, h)$ is given by:

$$E = \int_{x_1}^{x_2} \frac{k\lambda h}{(x^2+h^2)^{3/2}}\,dx$$

Find the numerical value of E assuming $\lambda = 6.0 \times 10^{-4}$ and $k = 8.99 \times 10^{9}$ and $h = 3$ and $(x_1, x_2) = (-15, 15)$.