

Substitution and Integration by Parts (Again)

(covers parts of Stewart 5.5 and 7.1)

Substitution

When using the substitution method with definite integrals, change your limits to be in terms of u .

Ex 1.

Evaluate:

$$\int_{-1}^1 3x^2 \sqrt{x^3 + 1} dx$$

Ex 2.

Evaluate:

$$\int_{\pi/4}^{\pi/2} \cot x \csc^2 x dx$$

Ex 3.

Evaluate:

$$\int_{-\pi/4}^{\pi/4} \tan x \, dx$$

Integration by Parts

Ex 4.

$$\int_0^1 x e^x \, dx$$

Ex 5.

$$\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \cos x \sin x \ln \sin x \, dx$$

Recall that $f(x)$ is even if $f(-x) = f(x)$, and $f(x)$ is odd if $f(-x) = -f(x)$.

If f is even, then $\int_{-a}^a f(x) dx = 2 \int_0^a f(x) dx$.

If f is odd, then $\int_{-a}^a f(x) dx = 0$.

Ex 6.

Evaluate:

$$\int_{-2}^2 (x^4 - 4x^2 + 6) dx$$

Ex 7.

Evaluate:

$$\int_{-\pi}^{\pi} \sin x dx$$