§5.3: MORE SUBSTITUTION

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April 23, 2021

ANNOUNCEMENTS

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SUBSTITUTION

Since

$$\frac{d}{dx}[f(g(x))] = f'(g(x))g'(x),$$

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Theorem

With $u = g(x)$,

$$\int f'(g(x))g'(x)\,dx = \int f'(u)\,du = f(u) + C = f(g(x)) + C.$$

ACTIVITY 5.3.2

EXAMPLES

Let's find

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

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$$\int \tan x\,dx \text{ and } \int \sec x\,dx$$

ACTIVITY 5.3.3

EVALUATING DEFINITE INTEGRALS

Observe:

$$\int_{\pi/2}^{\pi} e^{\sin x} \cos x \, dx = \int_{x=\pi/2}^{x=\pi} e^{\sin x} \cos x \, dx.$$

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Thus, when we change variables, we need to change limits:

ACTIVITY 5.3.4

CHALLENGE

Calculate $\int x\sqrt{1-x}\,dx$.