

Calculus I, Section 5.4, #40  
Indefinite Integrals and the Net Change Theorem

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Evaluate the integral.<sup>1</sup>

$$\int_{-10}^{10} \frac{2e^x}{\sinh(x) + \cosh(x)} dx$$

This is a definite integral, so we'll (eventually) apply FTC, Part 2.

$$\begin{aligned} \int_{-10}^{10} \frac{2e^x}{\sinh(x) + \cosh(x)} dx &= \int_{-10}^{10} \frac{2e^x}{\frac{e^x - e^{-x}}{2} + \frac{e^x + e^{-x}}{2}} dx \\ &= \int_{-10}^{10} \frac{2e^x}{\frac{e^x - e^{-x} + e^x + e^{-x}}{2}} dx \\ &= \int_{-10}^{10} \frac{2e^x}{\frac{2e^x}{2}} dx \\ &= \int_{-10}^{10} \frac{2e^x}{e^x} dx \\ &= \int_{-10}^{10} \frac{2e^x}{1} \cdot \frac{1}{e^x} dx \\ &= \int_{-10}^{10} 2 dx \\ &= [2x]_{x=-10}^{x=10} \\ &= (2 \cdot 10) - (2 \cdot (-10)) \\ &= 20 - (-20) \\ &= 40 \end{aligned}$$

Thus,

$$\int_{-10}^{10} \frac{2e^x}{\sinh(x) + \cosh(x)} dx = 40$$

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<sup>1</sup>Stewart, *Calculus, Early Transcendentals*, p. 409, #40.