

Let f and g be differentiable functions and k a constant. Here are four important theorems about differentiation.

- $(f(x) + g(x))' = f'(x) + g'(x)$.
- $(kf(x))' = kf'(x)$.
- $(f(x)g(x))' = f'(x)g(x) + f(x)g'(x)$.
- $(f(g(x)))' = f'(g(x))g'(x)$.

What are the four corresponding theorems about anti-differentiation (indefinite integration)? The first one has been started for you.

- $\int f(x) + g(x) dx =$
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Can you deduce the last two anti-differentiation theorems from the last two differentiation theorems?

Bonus (very difficult) question: Compute $\int_{-\infty}^{\infty} e^{-x^2/2} dx$.