

Limit Properties



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Fundamental Theorem of Calculus

- o If $f(x)$ is continuous on $[a,b]$ and $F'(x) = f(x)$:

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Integration by Substitution

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- o Example: Evaluate

Let $u = x^2$, so $du = 2x dx$.

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So, $\int 2x \cdot x^2 dx = \int 2u^{3/2} \cdot \frac{1}{2} du = \int u^{3/2} du = \frac{2}{5} u^{5/2} + C = \frac{2}{5} x^5 + C$.

Integration by Parts

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where

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- o Example: Evaluate

Let $u = x$ and $dv = e^{-x} dx$.

So, $\int x e^{-x} dx = x(-e^{-x}) - \int (-e^{-x}) dx = -x e^{-x} + \int e^{-x} dx = -x e^{-x} - e^{-x} + C = -e^{-x}(x+1) + C$.

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