Math 3B: Lecture 8

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The product rule

Just like integration by substitution reverses the chain rule, integration by parts "reverses" the product rule:

$$\frac{d}{dx}f(x)g(x) = f'(x)g(x) + f(x)g'(x)$$

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written another way

$$(uv)' = u'v + uv'$$

Integration by parts

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Lets integrate both sides

$$\int (uv)' \, dx = \int u'v \, dx + \int uv' \, dx$$

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By the fundamental theorem of calculus

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Rearranging...

Integration by parts

The integration by parts formula

$$\int uv' \, dx = uv - \int u'v \, dx$$

Integration by parts

The integration by parts formula

$$\int uv' \, dx = uv - \int u'v \, dx$$

Alternative statement

$$\int u \, dv = uv - \int v \, du$$

Examples

One the board. . .