

Exempel

Beräkna

$$\iint_D 5xy^4 \, dxdy$$

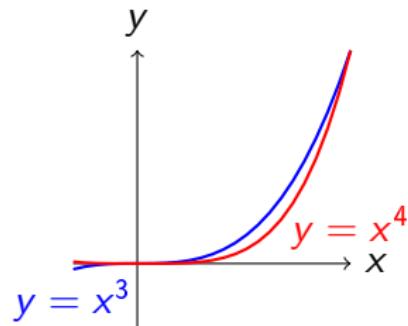
där $D = \{(x, y) \in \mathbb{R}^2 : x^4 \leq y \leq x^3\}$.

Lösning

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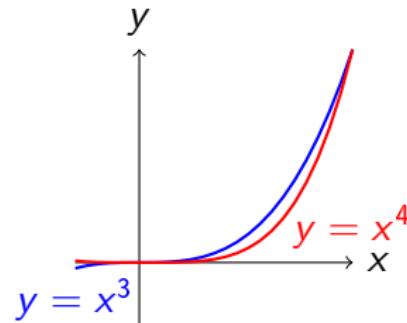
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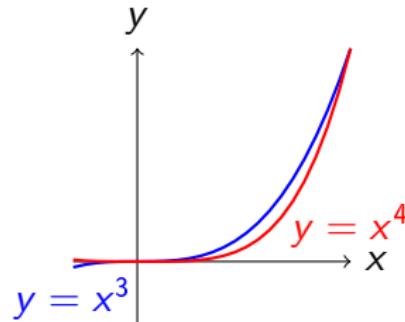
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$$D = \{(x, y) : 0 \leq x \leq 1, x^4 \leq y \leq x^3\}.$$

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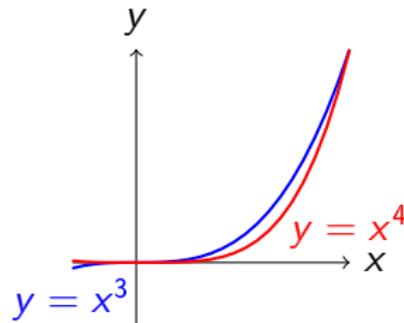


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$$\iint_D 5xy^4 dx dy = \int_0^1 \left(\int_{x^4}^{x^3} 5xy^4 dy \right) dx$$

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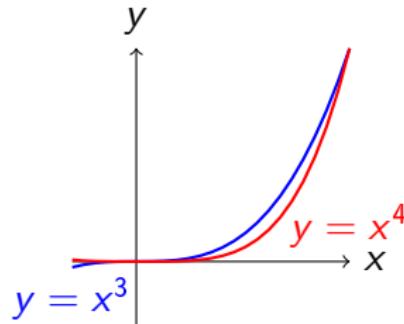


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$$\iint_D 5xy^4 dx dy = \int_0^1 \left(\int_{x^4}^{x^3} 5xy^4 dy \right) dx = \int_0^1 [xy^5]_{y=x^4}^{x^3} dx$$

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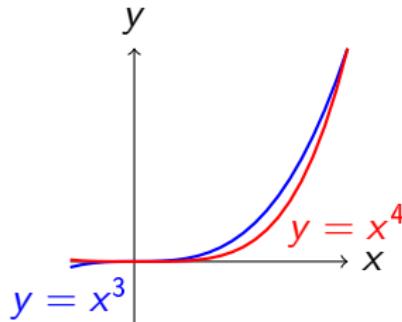


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$$\begin{aligned}\iint_D 5xy^4 dx dy &= \int_0^1 \left(\int_{x^4}^{x^3} 5xy^4 dy \right) dx = \int_0^1 [xy^5]_{y=x^4}^{x^3} dx = \\ &\int_0^1 (x \cdot x^{15} - x \cdot x^{20}) dx\end{aligned}$$

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$$\begin{aligned}\iint_D 5xy^4 dx dy &= \int_0^1 \left(\int_{x^4}^{x^3} 5xy^4 dy \right) dx = \int_0^1 [xy^5]_{y=x^4}^{x^3} dx = \\ \int_0^1 (x \cdot x^{15} - x \cdot x^{20}) dx &= \left[\frac{x^{17}}{17} - \frac{x^{22}}{22} \right]_0^1 = \frac{5}{374}.\end{aligned}$$