

The Definite Integral

ex. 1 Evaluate $\int_2^5 x^2 dx$

① Integrate $\left[\frac{x^3}{3} \right]_2^5$

or $\left. \frac{x^3}{3} \right|_2^5$

$$\begin{aligned} \int_2^5 x^2 dx &= \frac{5^3}{3} - \frac{2^3}{3} \\ &= \frac{125}{3} - \frac{8}{3} \\ &= \frac{117}{3} \\ &= 39 \end{aligned}$$

② Sub in values;
subtract between substitutions

ex. 2 Evaluate $\int_{-2}^3 (6x^2 - 5) dx$

$$\left[2x^3 - 5x \right]_{-2}^3$$

$$\begin{aligned} &2(3)^3 - 5(3) - (2(-2)^3 - 5(-2)) \\ &54 - 15 - (-16 + 10) \\ &45 \end{aligned}$$

* Brackets
so everything is
subtracted

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19-35
odds

(see pg. 288
Mean Value Thm)

$$f(c) = \frac{1}{b-a} \int_a^b f(x) dx$$