Integration notes

30 October 2017 08:15

Section A: Introduction to $\int$

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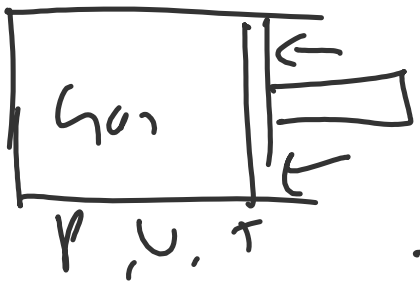
Integration - inverse of differentiation

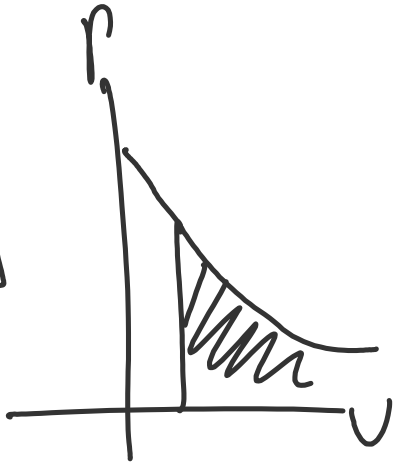
Let's try $\int$. A lot more difficult than differentiation.

$$\int_{-\infty}^{\infty} e^{-x^2}\,dx = \sqrt{\pi}$$

Xxxx

$$\int_{-\infty}^{\infty} e^{-x}\,dx$$



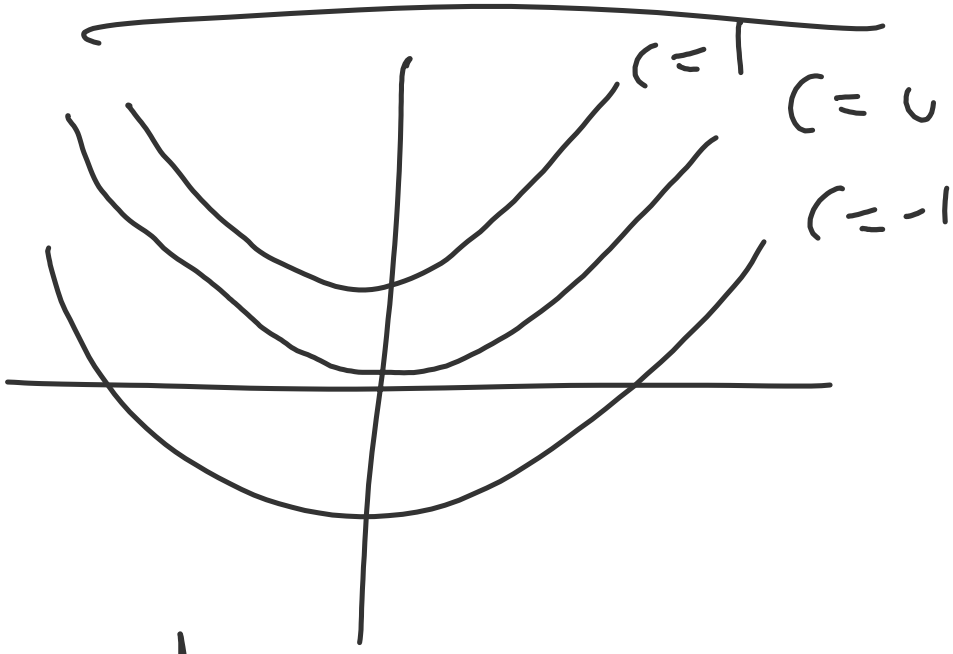


$\int$ - inverse of differentiation.

$\int y\,dx$ Integrand

$$\frac{d}{dx}(x^2) = 2x$$

$$\int 2x\,dx = x^2 + C$$



$$\frac{dy}{dx} = f'(x)$$

$$\int f'(x)\,dx = y + C$$

± If $y = x^4$ then

$$\frac{dy}{dx} = 4x^3$$

$$\int 4x^3\,dx = x^4 + C$$

$$\frac{d}{dx}(x^n) = nx^{n-1}$$

$$\int x^n\,dx = x^{n+1} + C$$

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

provided $n \neq -1$.

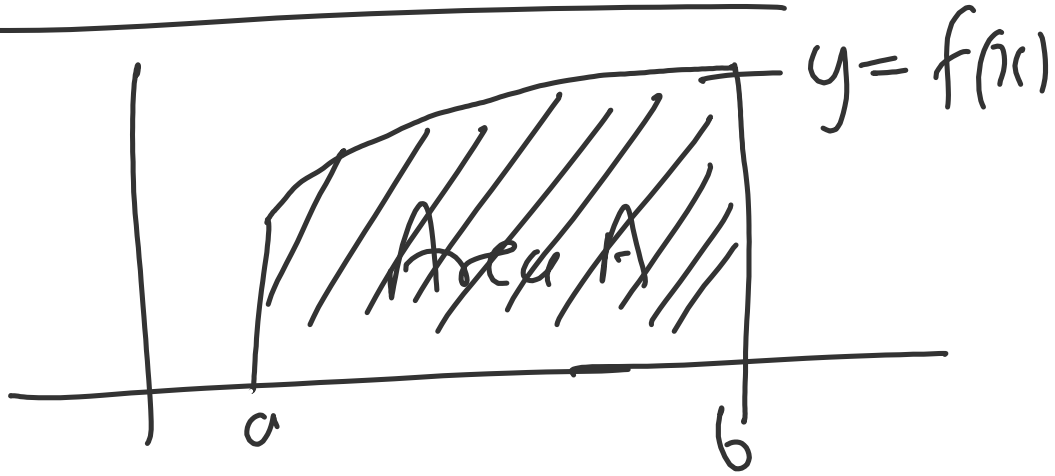
Ex: $\int x^3\,dx = \frac{x^4}{4} + C$

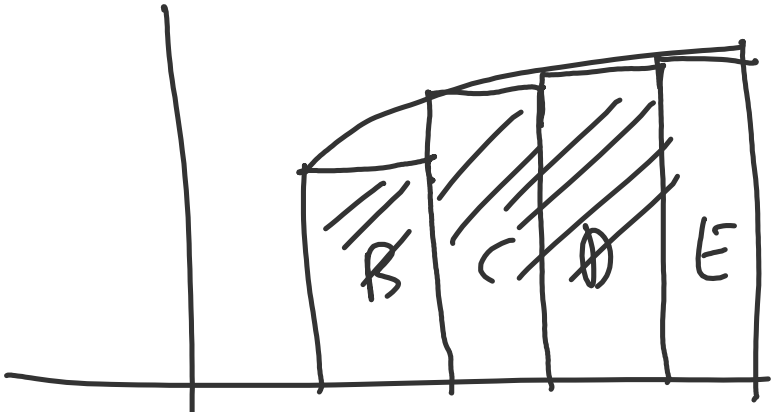
$\int x^7\,dx = \frac{x^8}{8} + C$

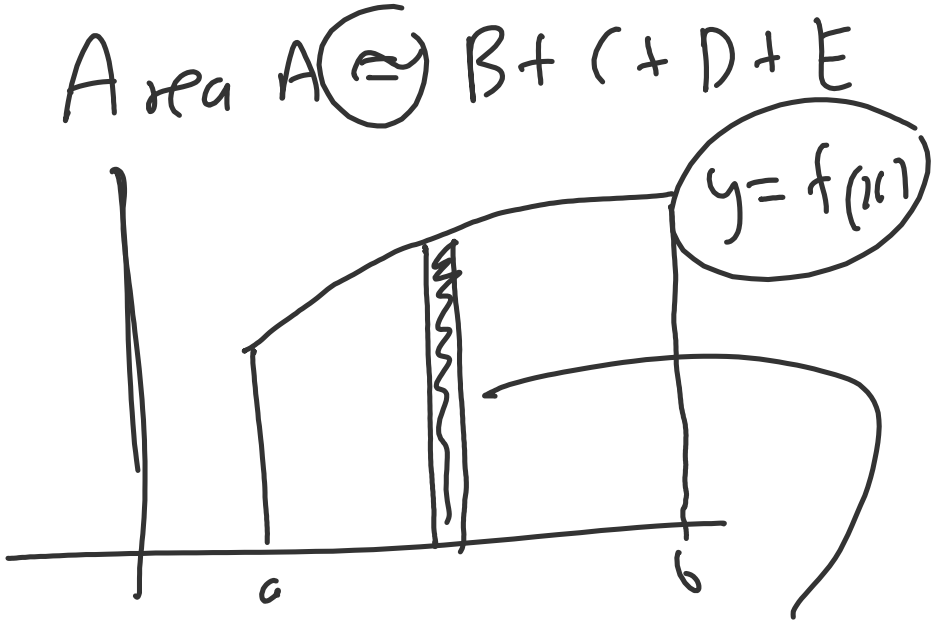
$\int x^{1/2}\,dx = \frac{x^{3/2}}{3/2} + C$

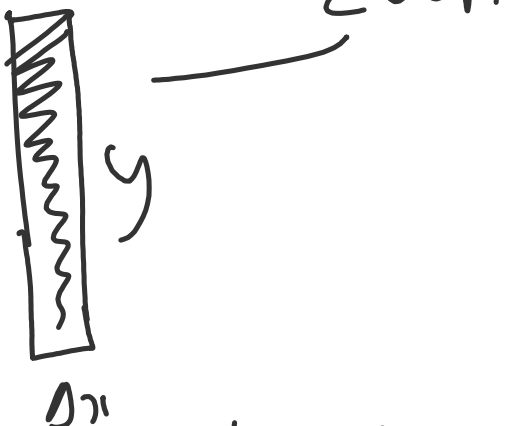
$= \frac{2x^{3/2}}{3} + C$

Physical sign of $\int$









Area of shaded rectangle is

$y\,\Delta x$

$$\text{Area} \approx \int_a^b y\,\Delta x$$

$$\text{Area} = \lim_{\Delta x \to 0} \int_a^b y\,\Delta x$$

$$= \int_a^b y\,dx$$

$$= \int_a^b y\,dx$$

Definite integral

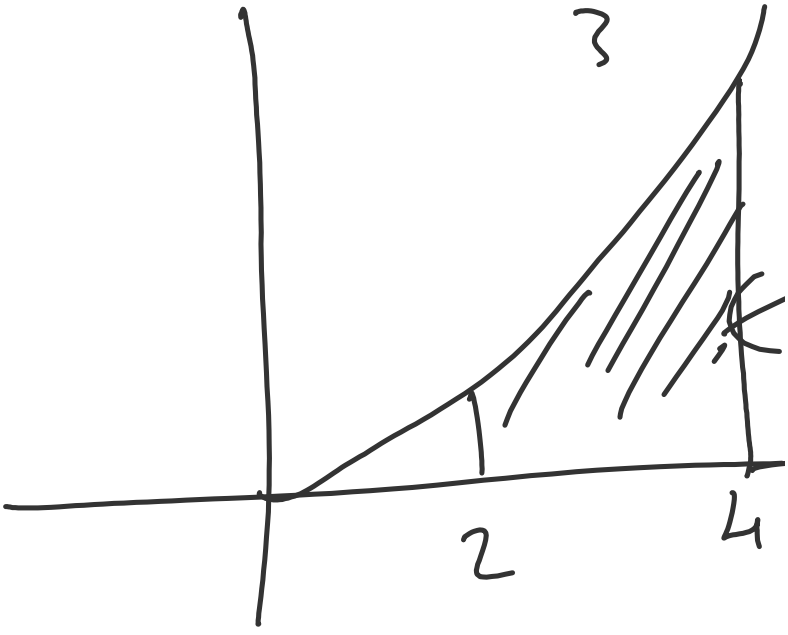
Ex: $\int_2^4 x^2\,dx$. $\int x^n = \frac{x^{n+1}}{n+1}$

Soln: $\int_2^4 x^2\,dx = \left[\frac{x^3}{3} + C\right]_2^4 =$

$= \left(\frac{4^3}{3} + C\right)$

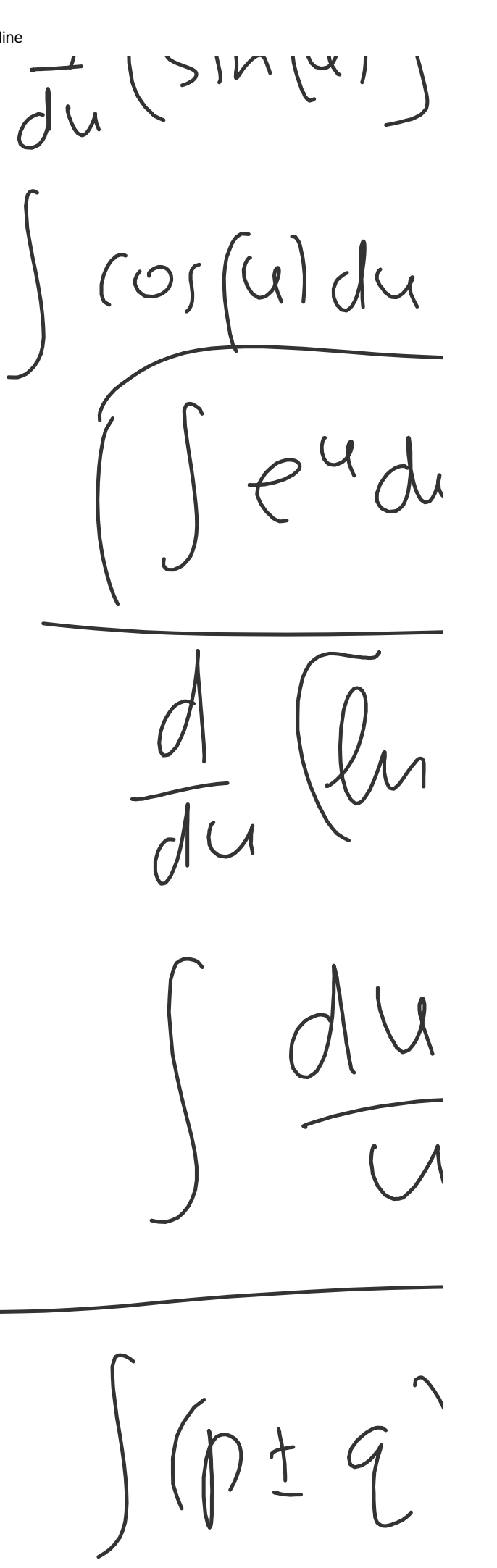
$= \frac{64}{3} + C$

$= \frac{56}{3}$



Rules of $\int$

$d\left[\sin(kx)\right]$



$$\frac{d}{du}(\sin(u))$$

$$\int \cos(u)\,du$$

$$\int e^u\,du$$

$$\frac{d}{du}(\ln$$

$$\int \frac{du}{u}$$

$$\int (p \pm q$$

$$\int k p \, dV$$

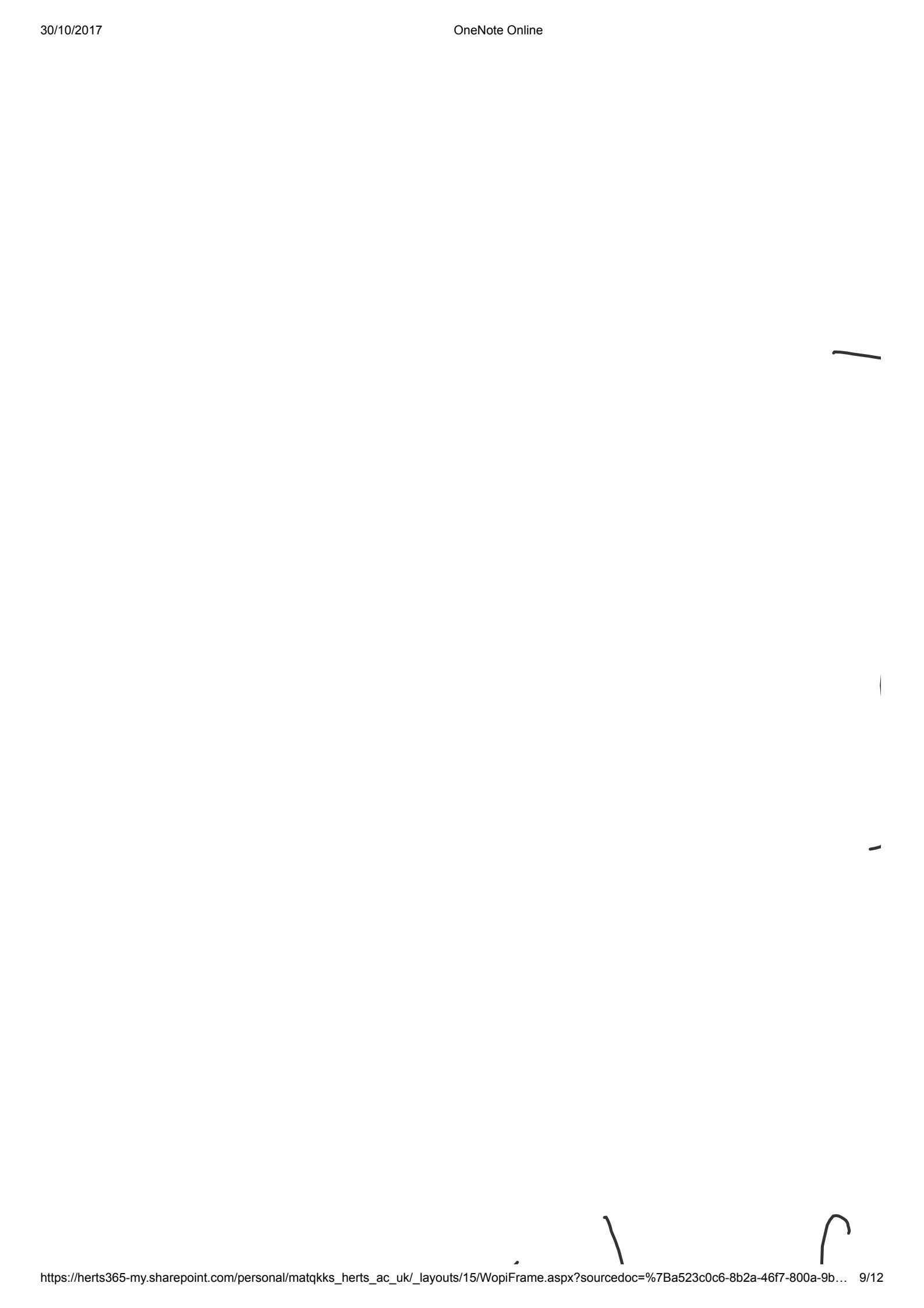
$$\int 5(3 -$$

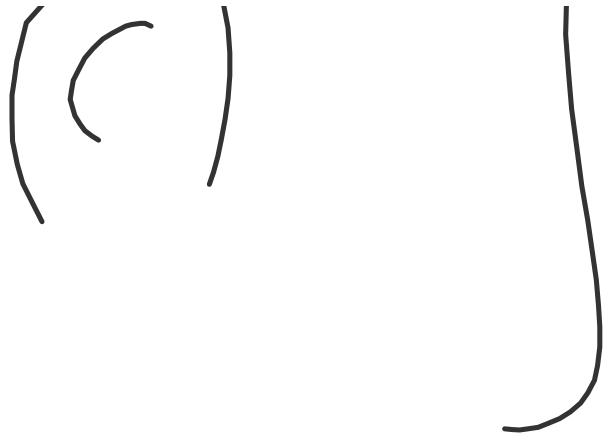
$$= \int x$$

$$= \int x$$

$$= \frac{2}{}$$

$$\int \frac{2}{}$$





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