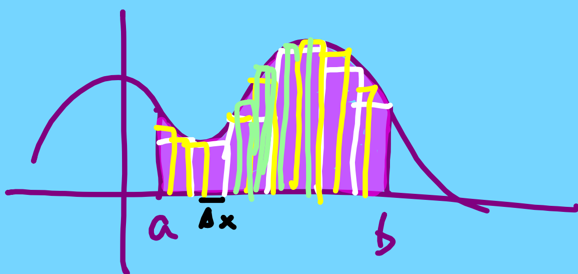
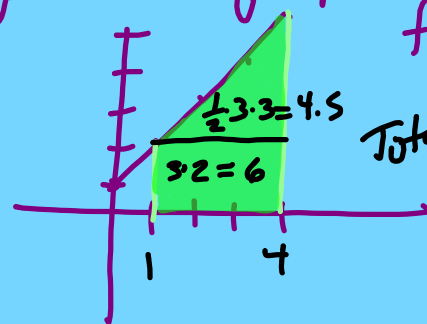
What does integration say about a graph?



$f(x) = x+1$



Total = 10.5

lw

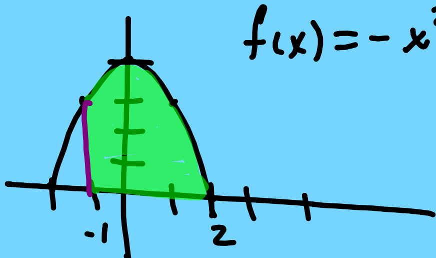
$$\lim_{\Delta x \to 0} \sum_{x=a}^{b} f(x)\,\Delta x$$

$$= \int_a^b f(x)\,dx$$

Sum the rectangles

$$\int \underline{\quad\quad} \,dx$$

$f(x) = -x^2+4$



$$\int_{-1}^{2} (-x^2+4)\,dx$$

$$\int_1^4 (x+1)\,dx$$

$$\frac{x^2}{2} + x \Big|_1^4$$

$$= 8+4-\left(\frac{1}{2}+1\right)$$

$$= 11-\frac{1}{2}$$

$$= 10\tfrac{1}{2}$$

INTRO TO CALCULUS

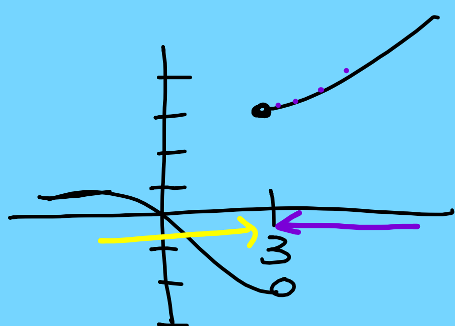
A derivatives represents . . . .

Integration represents the area between a function and the axis

Definition of Deriv.

$$\lim_{x \to a} \frac{f(x) - f(a)}{x - a}$$

Limits - find y-coord.!



$\lim_{x \to 3^-} f(x) = -2$ (y-coord)

$\lim_{x \to 3^+} f(x) = 3$

$\lim_{x \to 3} f(x) = \text{DNE}$

$f(3) = 3$

$$\lim_{x \to 4} \frac{3x^2 - 12x}{x^2 - 6x + 8} = \frac{0}{0}$$

$$\lim_{x \to 4} \frac{3x\cancel{(x-4)}}{\cancel{(x-4)}(x-2)} = \frac{3 \cdot 4}{4-2} = \frac{12}{2} = 6$$

1) Sub # in

2) If $\frac{0}{0}$,

a) factor

b) conjugates

DERIVATIVES

Find $f'(a)$. $f(x) = 2\sqrt{x} - 4$ | $f'(x) = x^{-1/2} = \frac{1}{\sqrt{x}}$

$$\lim_{x \to a} \frac{f(x) - f(a)}{x - a}$$

$$\lim_{x \to a} \frac{2\sqrt{x} \cancel{-4} + (2\sqrt{a} \cancel{+4})}{x-a}$$

$$\lim_{x \to a} \frac{2(\sqrt{x}-\sqrt{a})}{x-a} \frac{\sqrt{x}+\sqrt{a}}{\sqrt{x}+\sqrt{a}}$$

$$\lim_{x \to a} \frac{2\cancel{(x-a)}}{\cancel{(x-a)}(\sqrt{x}+\sqrt{a})}$$

$$\frac{2}{\sqrt{a}+\sqrt{a}} = \frac{\cancel{2}}{\cancel{2}\sqrt{a}} = \frac{1}{\sqrt{a}}$$

$$f(x) = \left(3x^7 - 4x^8 + 5\right)^{10}\left(\frac{7x^4 - 2x}{x^5 + 9}\right)$$

$$f'(x) = \left(3x^7 - 4x^8 + 5\right)^{10} \cdot \left[\frac{(x^5+9)(28x^3 - 2) - (7x^4 - 2x)\cdot(5x^4)}{(x^5+9)^2}\right]$$

$$+ \left(\frac{7x^4 - 2x}{x^5 + 9}\right) \cdot 10\left(3x^7 - 4x^8 + 5\right)^9 \cdot \left(21x^6 - 32x^7\right)$$

May 10, 2024

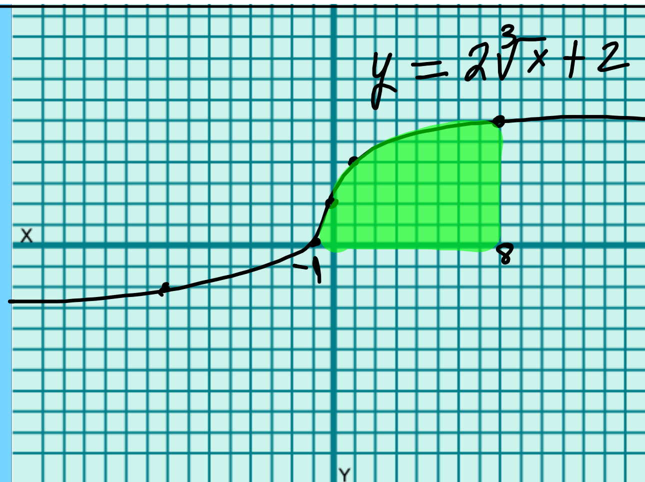
$$\int \frac{2x^5+3x^7}{x^4}\,dx$$

$$=\int (2x^5+3x^7)\,x^{-4}\,dx$$

$$=\int (2x+3x^3)\,dx$$

$$=\frac{2x^2}{2}+\frac{3x^4}{4}+C$$

$$=\boxed{x^2+\frac{3}{4}x^4+C}$$



$$\int_{-1}^{8}\left(2\sqrt[3]{x}+2\right)dx$$