

November 9

SWBAT:

Integrate using Partial
Fractions



$$\int \frac{4}{(x-2)(x+1)} dx$$

Decompose
the Function

$$\frac{4}{(x-2)(x+1)}$$



$$\rightarrow \int \frac{A}{x-2} + \frac{B}{x+1} dx$$

separate into a sum of rational functions
(linear functions in the denominator)

$$= \frac{A}{x-2} + \frac{B}{x+1}$$

$$= \frac{(x+1)}{(x+1)} \cdot \frac{A}{(x-2)} + \frac{(x-2)}{(x-2)} \cdot \frac{B}{(x+1)}$$

$$\frac{A(x+1) + B(x-2)}{(x+1)(x-2)} = \frac{4}{(x+1)(x-2)}$$

$$\frac{4}{(x+1)(x-2)} = \frac{\frac{4}{3}}{x-2} + \frac{-\frac{4}{3}}{x+1}$$

$$A(x+1) + B(x-2) = 4$$

$$\begin{aligned} \text{let } x &= -1 \\ A(-1+1) + B(-1-2) &= 4 \\ -3B &= 4 \rightarrow B = -\frac{4}{3} \end{aligned}$$

$$\begin{aligned} \text{let } x &= 2 \\ A(2+1) + B(2-2) &= 4 \\ 3A &= 4 \rightarrow A = \frac{4}{3} \end{aligned}$$

Decompose

$$\frac{x+3}{x^2-7x+10}$$



$$= \frac{x+3}{(x-2)(x-5)} = \frac{A}{x-2} + \frac{B}{x-5} = \frac{-\frac{5}{3}}{x-2} + \frac{\frac{8}{3}}{x-5}$$

$$\frac{x+3}{(x-2)(x-5)} = \frac{A(x-5) + B(x-2)}{(x-2)(x-5)}$$

$$x+3 = A(x-5) + B(x-2)$$

$$\text{let } x=5$$

$$5+3 = A(5-5) + B(5-2)$$

$$8 = 3B$$

$$\frac{8}{3} = B$$

$$\text{let } x=2$$

$$2+3 = A(2-5) + B(2-2)$$

$$A = -\frac{5}{3}$$

$$= \frac{-5}{3(x-2)} + \frac{8}{3(x-5)}$$