

how to integrate something like

$$\int_0^1 y \sqrt{4-y} dy = I$$

the idea is that you want to use substitution to get the sum/difference out from underneath the integral sign

so, substitute:

$$\text{let } u = 4 - y$$

$$du = -dy$$

$$\frac{du}{-1} = dy$$

which gives us

$$I = \int_{y=0}^{y=1} y u^{1/2} \frac{du}{-1}$$

but need to put in terms of u

$$\text{so } u = 4 - y \\ y = 4 - u$$

$$I = \int_{y=0}^{y=1} (4-u) u^{1/2} du$$

$$= \int_{y=0}^{y=4} (4u^{1/2} - u^{3/2}) du$$

← which is our old friend $\int_a^b u^n du$ and so you can use math 187 methods to integrate