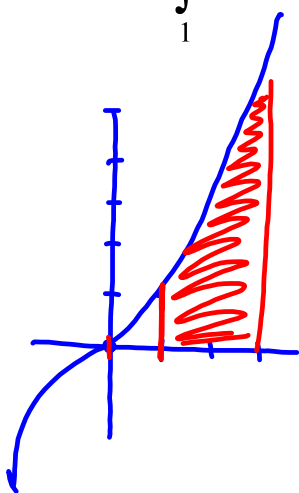


## AP Calculus Sec 4.4 The Fundamental Theorem of Calculus

All the work we did in the last section is now simplified into the Fundamental Theorem of Calculus.

$$\int_a^b f(x) dx = F(b) - F(a)$$

ex.  $\int_1^3 x^3 dx = \left[ \frac{x^4}{4} \right]_1^3 = \frac{3^4}{4} - \frac{1^4}{4} = \frac{81}{4} - \frac{1}{4} = \frac{80}{4} = 20$



$$\text{ex. } \int_0^2 |2x-1| dx$$

$$y = |2x-1| \quad 2x-1=0 \\ x = \frac{1}{2}$$



$$\int_0^{\frac{1}{2}} -(2x-1) dx + \int_{\frac{1}{2}}^2 (2x-1) dx$$

$$\int_0^{\frac{1}{2}} (-2x+1) dx$$

$$\left[ -\frac{2}{2}x^2 + x \right]_0^{\frac{1}{2}} + \left[ \frac{2}{2}x^2 - x \right]_{\frac{1}{2}}^2$$

$$-x^2 + x \Big|_0^{\frac{1}{2}} + x^2 - x \Big|_{\frac{1}{2}}^2$$

$$\left( -\frac{1}{4} + \frac{1}{2} \right) - (0+0) + (4-2) - \left( \frac{1}{4} - \frac{1}{2} \right)$$

$$\frac{1}{4} + 2 + \frac{1}{4} = 2\frac{1}{2} = \frac{5}{2} \text{ or } 2.5$$

Princeton Book  
p.314 5-10all