

Lecture 10

Thursday, January 26, 2023 8:10 AM

* Questions ...

* Quiz 1

Fundamental thm of Calculus

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

where F is any antiderivative of f .

Notation. $F(x) \Big|_a^b = F(b) - F(a)$

$$\underline{\underline{Ex}} \quad \int_1^2 x dx = \left. \frac{x^2}{2} \right|_1^2 = \frac{2^2}{2} - \frac{1^2}{2} = \frac{3}{2}$$

$$\underline{\underline{Ex}} \quad \int_1^3 \frac{1}{\sqrt{x+1}} dx = \int_1^3 (x+1)^{-1/2} dx = \left. \frac{(x+1)^{1/2}}{1/2} \right|_1^3 = \frac{4^{1/2}}{1/2} - \frac{2^{1/2}}{1/2} = 2(2 - \sqrt{2}).$$

$$\underline{\underline{Ex}} \quad \int_0^3 (2 - |x-2|) dx = \int_0^2 (2 - (2-x)) dx + \int_2^3 (2 - (x-2)) dx$$

$$= \int_0^2 x dx + \int_2^3 (4-x) dx$$

$$= \left. \frac{x^2}{2} \right|_0^2 + \left. \left(4x - \frac{x^2}{2} \right) \right|_2^3$$

$$= \frac{2^2}{2} - \frac{0^2}{2} + \left(4(3) - \frac{3^2}{2} \right) - \left(4(2) - \frac{2^2}{2} \right)$$

$$= \frac{7}{2}$$